Government
Publications
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Ontario, Legislative Assembly

Sessional papers

SESSIONAL PAPERS.

VOLUME XVI.—PART IV.

FIRST SESSION OF THE FIFTH LEGISLATURE

OF THE

PROVINCE OF ONTARIO.

SESSION 1884.

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No. 50.. Return of all correspondence, reports and papers connected with the dismissal of John McEwen, Esquire, from the office of Sheriff of the County of Essex, and of the appointment, in his place and stead, of John C. Iler. *(Not printed.)*

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No. 54.. Return shewing in detail all sums claimed by or allowed to Returning Officers, Deputy-Returning Officers or other persons, for services and expenses in connection with the last Election in the District of Algoma. *(Not printed.)*

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No. 57.. Return of copies of all correspondence with the Government, or any member thereof, relating to the project of establishing an International, Dominion or Provincial Park at Niagara Falls. *(Not printed.)*

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No. 59.. Return shewing the total amount expended for repairs of the Parliamentary and Departmental Buildings, and for rents and repairs of temporary offices, since the 1st day of January, 1880.

No. 60.. Return of copies of all correspondence, petitions or memorials, respecting the appointment of Stipendiary Magistrates and Division Court Judge for the Provisional County of Haliburton; also, copies of all correspondence, petitions, resolutions, memorials, or other papers forwarded to the Government, or any member thereof, relating to the said appointment, either prior to or since said appointment was made, with dates of each communication respectively. *(Not printed.)*

No. 61.. First Report of the Inspector of Legal Offices for the year 1883.

No. 62.. Statements and Returns of the Toronto General Trusts Company for the years 1882 and 1883. *(Not printed.)*

No. 63.. Return of copies of all correspondence and memorials respecting the appointments of Police Magistrates in the Villages of Merrickville and Cardinal. Copies of all correspondence between the head of the municipality of the Town of Prescott, or any member of the Council thereof, or of any other person, with the Honourable The Attorney-General, or any member of the Government, relating in anywise to the appointment of a police magistrate for the said Town of Prescott; and of all petitions, resolutions, memorials or other papers forwarded to the Government or any member thereof, relating to the said appointment, either prior to or since said appointment was made, with dates of each communication respectively. *(Not printed.)*

No. 64.. Return of copies of all correspondence between the Government, or any member thereof, and the representatives of the various municipalities bordering on Lakes Simcoe and Couchiching, or any other person or persons, together with all reports and papers (not already brought down) on the subject of removing the obstructions from the Severn River, near the outlet of Lake Couchiching, whereby the waters of Lakes Simcoe and Couchiching would be lowered and a large quantity of land reclaimed. *(Not printed.)*

No. 65.. The Bursar's Statement of cash transactions of Upper Canada College, for the year ended 30th June, 1883. *(Not printed.)*

No. 66.. The Bursar's statement of cash transactions of the Toronto University and University College, for the year ended 30th June, 1883.

No. 67.. Statement of the amount of Fees and Emoluments earned, and disbursements made by County Crown Attorneys of the Province of Ontario, for the year ending 31st December, 1883, in accordance with the provisions of 43 Victoria, Cap. 3, Sec. 2, Statutes of Ontario.

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No. 72.. Copies of all correspondence between the Governments of Ontario and Quebec, or any member or officer thereof, relating to, or containing the agreement come to between the said Governments, whereby the boundary between the Provinces of Upper and Lower Canada, now respectively named the Provinces of Ontario and Quebec, north of Lake Temiscamingue, which have never been authoritatively determined, was agreed to be determined in the manner enacted and set forth in the Act, Chapter three, of the Consolidated Statutes of Ontario, but subject also to ratification by the Legislature of the said Province of Quebec, and by the Parliament of Canada. And also copies of all correspondence between the Government of the Province of Ontario, or any member or officer thereof, and the Government of the Dominion, or any member or officer thereof, with regard to the said boundary, and with regard to the ratification thereof by the Parliament of Canada.

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No. 78.. Return shewing the amount paid to each railway out of the funds of this Province up to December 31st, 1883; also, the number and total amount of unpaid certificates that each of the aforesaid railways are entitled to. And, also, the railways which are entitled to aid under any of the enactments of the Province, but, to which no money has, as yet, been paid; such Return to shew the total amount they are entitled to, either by a direct payment or by certificate; also, to shew the total amount payable in each year.

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No. 81.. Copies of all correspondence between the Government of Ontario, or any member thereof, and the Government of the Dominion, or any officer thereof, respecting any claim for arrears or annuities due to the Indians, or the Dominion on behalf of the Indians, under Treaties for the relinquishing of Territorial rights on the shores of Lakes Huron and Superior, known as the "Robinson Treaties."

No. 82.. Return of copies of all correspondence and communications between the junior Judge of the County of Ontario, or any other person, and the Attorney-General, or any member or officer of the Government, with regard to the conduct of one J. P. Foley, Esquire, of Mara, one of the Justices of the Peace for the said County. *(Not printed.)*

No. 83.. Report of the Department of Immigration for the year 1883.

No. 84.. Return of copies of all Orders in Council, or departmental regulations, with regard to the powers or duties of the Public School Inspectors as to changes in the text books in use in the schools within their Inspection Districts, and of all circulars issued by the Department of Education with reference to such powers, or duties, or the authority under which such changes should be made.

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No. 88.. Return of copies of all correspondence and communications with or by the Attorney-General, or any member or officer of the Government, and any other person, and all reports and Orders in Council with reference to the removal from the office of Police Magistrate of Port Perry, of John Nott, Esquire. *(Not printed.)*

No. 89.. Return of copies of all general rules and orders made by the judges since the passing of the Ontario Judicature Act, and all general rules and orders made by the Court of Appeal.

No. 90.. Return of all correspondence between the Executive of the Lambton Prohibitory Association and the Provincial Secretary, or any other member of the Government, with regard to the appointment of a License Officer at Petrolea. Also, copies of all communications and correspondence between the Government, or any member thereof, and any other persons, with reference to such appointment. Also, copies of all correspondence between the License Commissioners for West Lambton and any other person, or body, with regard to such appointment. Also, copies of any recommendations made to the Executive Council, with reference to such appointment, and of all Orders in Council relating thereto. *(Not printed.)*

No. 91.. Return of a copy of the circular issued from the Attorney-General's Department, bearing date on the 14th day of January, 1882, with respect to the efficiency or otherwise of the present system of detecting crime and bringing the offenders to justice, with the answers to the circular, and any other correspondence on the subject.

No. 92.. Return shewing the names and residences of the members now comprising the Central Committee of Examiners. The dates of their several appointments. Copies of all Orders in Council or Departmental Regulations defining the powers and duties of the Committee. Copies of the minutes of the proceedings of the Committee, except those relating to examinations since first day of January, 1882. Copies of all recommendations made by the Committee to the Minister of Education, or the Government, upon any matter upon which they have made recommendation. *(Not printed.)*

No. 93.. Return of copies of all Orders in Council, Departmental Regulations or instructions, with regard to the use of Text Books in the Normal and Model Schools since 1867.

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No. 95.. Return shewing, from the institution of the office, the dates at which the Reports of the Inspector of Insurance Companies have been laid upon the Table of the House, and the year for which such statement was prepared. And that a corresponding statement be submitted, giving like dates and years, with regard to the similar Reports respecting Insurance Companies made to the Parliament of the Dominion, by their like officer.

No. 96.. Return of copies of all Petitions from Municipal Corporations, praying for the investigation of the Financial Standing of said Corporations, and also, all correspondence between the Government and said Corporations, in regard thereto. *(Not printed.)*

No. 97... Return of copies of all communications between the Senate of the University of Toronto and the Government, on the subject of further State Aid to the University.

No. 98.. Copy of certain Resolutions passed as to a meeting of the graduates and other friends of Queen's University, Kingston, resident in that city, and held on the fourth day of March instant. *(Not printed.)*

No. 99.. Return giving:—1. The names of the officers and directors of the Muskoka Slide Dam and Boom Company, and a copy of the Charter of the said Company. 2. Copies of all correspondence (if any) with reference to the transfer to the said Company of the whole, or any part of the Muskoka River works, or the fixing of the tolls to be taken by the said Company. 3. Copies of the tariff of tolls adopted by the said Company, or approved of by the Lieutenant-Governor in Council. 4. A statement of the amounts expended in each year since Confederation on such part of said works. *(Not printed.)*

No. 100. Return shewing in each and every year since 1871, inclusive, the amount of money paid by the teachers of Ontario into the Superannuated Teachers' Fund; the amount paid out by the Government to superannuated teachers; the amount in each year paid out in excess of the amount paid into said fund; the total amount paid out of said fund; and the amount of the latter over the former. And the amount paid out to teachers who have withdrawn from the fund during the same period.

No. 101. Return shewing the names of the persons to whom, the prices for which, and the dates when the water fronts or lots, at or near Prince Arthur's Landing, were sold or disposed of. Also, a Return shewing in which of the grants any of the said water lots or fronts a reservation is made of a right of way for the Canadian Pacific Railway. And also, a map or sketch, shewing the position of each of the said water fronts or lots sold or disposed of, specially with reference to the streets of Prince Arthur's Landing. *(Not printed.)*

No. 102. Return shewing in detail the municipalities which have borrowed from the Province under the provisions of the Tile Drainage Act and Municipal Drainage Act; the date of the loans; the amounts borrowed; the terms of payments of the debentures purchased by the Province; the amounts paid on account thereof for principal and interest, shewn separately; the amounts remaining unpaid for principal and interest, shewn separately.

No. 103. Statement shewing the amount of money on deposit in the Banks, or other moneyed institutions, to the credit of the Province on the first days of January, February and March, 1884, respectively, whether in the Province or elsewhere, giving the name of each Bank or other institution wherein these moneys are deposited, and the amount in each, respectively. Also, the amount at interest in each Bank or other institution, and the rate of interest allowed in each case on said deposits; and the amount available on call without interest in each Bank or elsewhere, with their names in each case.

No. 104. Return shewing the respective amounts paid by such Municipalities in the Province of Ontario in which the Dunkin or other Temperance Acts are in force, towards the License Fund of the District in which they are situated.

No. 105. Return shewing:—1. The several lots in the Townships of Tudor, Wollaston, Limerick and Faraday, in the County of Hastings, which have been sold, located, disposed of or applied for since January 1st, 1880. 2nd. The dates of said sales; the persons to whom sold; the prices paid and terms of payments. 3rd. The dates of the several applications for the purchase or location of said lots.

No. 106. Report of the Secretary and Registrar for the year 1883.

No. 107. Return of copies of all instructions given to, and reports and correspondence from, the "Consulting Board" or other persons, with reference to the erection of three Public Creameries provided for in the Estimates for 1883, and a statement of all moneys paid to or still due any member of such Board, or other person, for his services in connection therewith.

No. 108. Return shewing the names of all prisoners in the Central Prison, who, during the year 1883, were punished for infraction of the Prison Rules, giving the date and nature of such punishment. A copy of the Surgeon's Certificate or Report, in reference to prisoners who were punished during the year 1883 in the Central Prison. The names of all prisoners who were sent from the Central Prison to the Asylum for the Insane during the year 1883. *(Not printed.)*

No. 109. Return shewing what lands in the District of Algoma (including the Disputed Territory), have been sold or disposed of since the first day of January, 1882; with the names of the persons to whom such lands were sold, and the price *per* acre paid or agreed to be paid therefor, and how much of it still remains unpaid, and, so far as practicable, the names of persons by whom such lands are now owned or held. *(Not printed.)*

No. 110. Return of copies of all Orders in Council passed under the authority of the General Mining Act creating, extending, adding to, or diminishing mining divisions. *(Not printed.)*

No. 111. A Statement shewing in detail all claims brought before the Commissioners appointed in the Disputed Territory (Messrs. Pattullo and Burden), or either of them; the dates when they were made, and the disposal made of them by the Commissioners, and when such disposal was made. 2. A statement in detail of all expenditures for salaries and otherwise in connection with the Commission issued to them. *(Not printed.)*

REPORT

OF THE

ENTOMOLOGICAL SOCIETY

OF ONTARIO,

FOR THE YEAR 1883.

Printed by Order of the Legislative Assembly.

Toronto:
PRINTED BY C. BLACKETT ROBINSON, 5 JORDAN STREET.
1884.

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FOURTEENTH ANNUAL REPORT

OF THE

ENTOMOLOGICAL SOCIETY

OF

ONTARIO,

INCLUDING REPORTS ON SOME OF THE NOXIOUS, BENEFICIAL AND OTHER INSECTS OF THE PROVINCE,

PREPARED FOR THE HONOURABLE THE COMMISSIONER OF AGRICULTURE, BY THE OFFICERS AND MEMBERS OF THE SOCIETY.

1883.

To the Honourable the Commissioner of Agriculture:

Sir,—In accordance with the provisions of our Act of Incorporation, it becomes my duty to present to you herewith the Fourteenth Annual Report of the Entomological Society of Ontario.

The Annual Meeting of the Society was held in the City of London, on October 3rd, 1883, when the officers for the ensuing year were duly elected, and the necessary business of the Society transacted.

The account of the meeting, and the audited Financial Statement, are also submitted herewith.

In pursuance of one of the chief objects for which this Society was established some fifteen years ago, illustrated reports of various noxious and beneficial insects have been prepared by members of the Society for publication (with your approval), for the benefit of those interested in Agriculture and its kindred pursuits.

The publication of the *Canadian Entomologist* is still maintained, the Society having nearly completed the fifteenth volume.

I have the honour, Sir, to remain,

Your obedient servant,

Edmund Baynes Reed,

Secretary-Treasurer.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting of the Society was held in London at the Society's Rooms, Victoria Hall, on Wednesday, October 3rd, 1883, at 7.30 o'clock p.m.

The President, Mr. William Saunders, of London, Ont., in the chair.

Present :—Rev. C. J. S. Bethune, M.A., Port Hope ; Rev. T. W. Fyles, Levis, P.Q ; James Fletcher, Ottawa ; R. A. Hanham, Paris ; W. H. Harrington, Ottawa; J. M. Denton, London ; B. Gott, Arkona ; A. Puddicombe, London ; F. C. Lowe, Dunnville ; H. P. Bock, London ; W. E. Saunders, London ; J. Magnus Johnston, London ; the Secretary-Treasurer, E. Baynes Reed, and others.

The minutes of the previous meeting were confirmed, the reading being dispensed with, as they had already been printed, and sent to the members.

The President addressed a few words of welcome to the members, expressing the pleasure which the London brethren felt at meeting their fellow-workers from the various parts of the Province.

The Report of the Council and the Financial Statement of the Secretary-Treasurer or the past year were then read, and on motion duly received, discussed, and adopted.

REPORT OF THE COUNCIL FOR 1883.

The Council desire in presenting their Annual Report to congratulate the members on the continued activity and prosperity of the Entomological Society of Ontario. The stimulus given to our scientific and economic work by the meeting last year in Montreal, when we were favoured with the presence and co-operation of so many distinguished entomologists, has done much to promote Entomology in Canada, and we look forward with additional satisfaction to the prospect of meeting some of our European fellow-labourers at the scientific gathering of the British Association which is to be held next year in Montreal.

A large number of the insects in our collection have been forwarded for exhibition at the International Fisheries Exhibition now being held in Great Britain, your Council having gladly acceeded to the request of the Minister of Marine and Fisheries to add in this way to the interest of the Dominion exhibit. The collection arrived in England safely, and has attracted much attention, and has added to the reputation already possessed by the Society ; every precaution has been taken for the safety of this collection and its due return.

During the year a very complete general Index to our thirteen Annual Reports has been prepared, which has added greatly to their value.

Early in the spring we were honoured with a request from the Royal Society of Canada to send a representative to their meeting, which was to be held in Ottawa in May. The Council appointed Mr. James Fletcher, who duly attended the meeting of that learned body, and read a statement of the objects and condition of the Society.

At the recent meeting of the American Association for the Advancement of Science, held at Minneapolis, Minnesota, our Society was represented by the President, who has prepared a report of the proceedings of the Entomological Club for publication in the Society's Annual Report.

The Council purpose still to continue their efforts to obtain a more liberal interpretation of the existing Customs' regulations, so as to render such supplies as our Society may need for its scientific work free of duty. Efforts have also been made through the Royal Society of Canada to obtain more favourable postal regulations for the transmission of entomological and botanical specimens in order to facilitate exchanges between students in this country and those in Europe and America.

The thanks of the Society are due to Prof. James Bell, of Albert College, Belleville, who has kindly contributed a variety of beautifully prepared microscopical objects for the use of the Society.

Numerous additions have been made to the Library, among which special mention may be made of six of the beautifully illustrated volumes published by the British Government containing some of the scientific results of the Challenger expedition. The new edition of the Micrographic Dictionary; Insects Injurious to Fruits, by Mr. Saunders; and a complete series, coloured, of the magnificent illustrated works on Entomology, by the late Prof. Townend Glover.

In conclusion, the Council cannot refrain from expressing their gratification that our President, Mr. Wm. Saunders, has completed and published his able work on "The Insects Injurious to Fruits," thus supplying a much needed manual for the guidance of Fruit-growers and Horticulturists.

The audited Report of the finances will be submitted as usual; on behalf of the Council.

E. Baynes Reed,
Secretary-Treasurer.

ANNUAL STATEMENT OF THE SECRETARY-TREASURER OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO, FOR THE YEAR ENDING SEPTEMBER 30th, 1883.

Receipts.

Balance from previous year, 1882	$55 98
Members' fees, sale of *Entomologist*, etc	336 61
Provincial grant, 1883	1000 00
Dominion grant for Fisheries Exhibition	200 00
Collectors' material—pins, cork, etc	26 79
Interest on Bank account	9 50
Engraving—received for electrotypes of cuts	2 42
	$1,631 30

Disbursements.

Canadian Entomologist: printing, paper, stationery, etc., including reprints of earlier volumes	$618 67
Library account	116 52
Expenses of Report for 1882, including engraving, electrotypes and woodcuts, and also of Index to the thirteen Annual Reports	303 40
Expenses of preparing cases for Dominion Fisheries Exhibition	200 00
Annual vote to Editor and Secretary-Treasurer	175 00
Rent	80 00
Caretaker	12 00
Insurance	16 00
Collectors' material: pins, etc	58 95
Sundries: Postage, etc.	42 29
Balance	8 47
	$1,631 30

We certify that we have examined the above account with books and vouchers, and found the same to be correct. Balance in bank eight dollars and forty-seven cents.

Charles Chapman,
H. P. Bock, } *Auditors.*

Entomological Society's Rooms, London, Ont.
October 7th, 1883.

The report of the Montreal branch of the Society was next submitted.

MONTREAL BRANCH, ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Tenth Annual Meeting of this branch was held at the residence of the President, H. H. Lyman, Esq., M.A., Montreal, on Tuesday, 8th May, 1883, at 8 o'clock, p.m.

President read the following report of the operations of the Society for the year :—

REPORT.

Your Council beg to submit the Tenth Annual Report of the Branch.

Five regular meetings have been held during the year, and in addition to these, the members have had the pleasure of attending the Annual Meeting of the parent Society, which was held in the rooms of the Natural History Society, on the 24th August last, during the session of the American Association for the Advancement of Science. The opportunity of meeting with many of the entomologists of the United States, and the President and other officers of our Canadian Society, was highly appreciated by our members.

The following original papers have contributed to the interest of our meetings during the year :—

1. Description of a *Dipterous* parasite on *Phylloxera vastatrix*, by the Rev. T. W. Fyles.
2. Sir John Lubbock on Ants, by G. J. Bowles.
3. Notes on the Genus *Callimorpha*, by H. H. Lyman.
4. Preliminary list of the *Geometridæ* of Quebec and Montreal, by G. J. Bowles.
5. Notes on some diurnal *Lepidoptera* occurring in Canada, by F. B. Caulfield.
6. Causes of rarity in ssme species of insects, by G. J. Bowles.

The whole respectfully submitted.

H. H. Lyman,
President.

The Report having been adopted, the election of officers took place, with the following result :—

G. J. Bowles, President; W. Cooper, Vice-President; F. B. Caulfield, Secretary-Treasurer; J. G. Jack, H. H. Lyman, W. Shaw, H. Graves, Council.

A very pleasant hour was then spent in examining the President's collection of *Lepidoptera* and the scarce and valuable illustrated entomological works in his library.

Geo. John Bowles,
Secretary.

The President then delivered his annual address, for which he was unanimously accorded a vote of thanks and requested to publish it in the *Canadian Entomologist*.

ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

Gentlemen,—Twenty years ago, on the afternoon of the 16th of April, 1863, there met at the rooms of the Canadian Institute in Toronto nine gentlemen interested in entomology, for the purpose of organizing a society having for its object the advancement of entomology in Canada. These gentlemen had been called by special invitation of the Rev. C. J. S. Bethune and myself, and in addition to the nine who responded by their presence, letters of apology were received from five others expressing regret at their being unable to attend ; these fourteen comprised all who at that time took an active interest in entomology in Canada.

A society was duly organized under the name of the Entomological Society of Canada, with Professor Croft, of Toronto, as its first President. Two scientific papers on insects were presented and read, and a number of interesting insects exhibited. Application was made to the Council of the Canadian Institute for the use of a room in their building, which was kindly granted free of expense, and it was resolved to hold monthly meetings for the discussion of entomological subjects.

In December of the same year a committee was appointed to prepare and publish catalogues of the names of insects in the orders of *Coleoptera* and *Lepidoptera*, and in May the following year the committee reported that the list of *Lepidoptera* had been completed and published, and that considerable progress had been made in determining the species of *Coleoptera*, but not sufficient to warrant the publication of the catalogue. This catalogue was completed and published shortly after. Before the close of this meeting committees were appointed charged with the special duty of paying particular attention to the study of insects injurious to vegetation.

Previous to this nothing had been done in Canada in the important department of Economic Entomology, no information was available to the farmer or fruit grower in reference to most of the insect pests which destroyed his field crops or fruit unless he happened to be the fortunate possessor of a volume published in New England by Dr. Harris under the title of Insects Injurious to Vegetation in Massachusetts, and this, although a very useful work, only partially met the wants of the practical farmer. Dr. Fitch, State Entomologist for New York, had published his first nine reports and was almost the only active labourer in this important department of insects injurious to agriculture, but his works were not accessible to many in this country.

In scientific entomology but little had been done in Canada up to this period. Several catalogues of the names of insects captured in this country had appeared in the *Canadian Naturalist* the organ of the Natural History Society of Montreal, and the occurrence of several rare species of butterflies had been noted. Messrs. Wm. Couper and B. Billings, of Montreal, had also communicated some papers to the same journal, urging the importance of the study of entomology, and referring to the habits of some of the pine borers and other prominent insects, but the circulation of the *Naturalist* was so limited that the information given reached but few in the community.

The Entomological Society of Canada at first had no funds to enable them to publish reports of their proceedings beyond the small sum derived from the annual fees of the members; but among these were a number of active workers, who, by careful and systematic observation and study, were rapidly accumulating stores of knowledge which were destined to be of much value in the future to the great community of farmers and horticulturists. At first the proceedings of the infant society were published in the Canadian Journal, but soon it was felt to be most desirable, in order to give them the prominence they deserved, that the records of facts observed by the members should be published in a separate form, and early in 1867 an effort was made to obtain some assistance from the Canadian Government to aid the Society in carrying out this object; but at a meeting held the 1st of June, 1867, a communication was presented from the Finance Minister of the united Provinces to the effect that he could not recommend any fresh grants for scientific objects, as the country was on the eve of confederation. The annual report of the secretary presented at this meeting showed that the membership had been increased to forty-eight. The meeting was to have been followed by a field day, but the Fenian raid, which just then occurred, called some of the members away to their duty as volunteers, and others to the defence of their homes.

In August, 1868, the first number of the *Canadian Entomologist* appeared under the editorship of our esteemed coadjutor, Rev. C. J. S. Bethune, of Port Hope. It was a humble looking sheet of eight pages only, and this was not promised to be issued at any regular intervals, but from time to time as material accumulated which was thought to be worthy of publication. To meet the expenses of publication, voluntary contributions were made by many of the members, and the journal was thus sustained and issued monthly for fifteen months, during which time it was found to be so useful that it met with encouragement everywhere. It had also acquired a reputation abroad, and many entomologists in Great Britain and the United States had become regular subscribers. Early in 1870 the

Council of the Agricultural and Arts Association of Ontario recognizing the important bearing of entomology on agriculture, liberally appropriated the sum of four hundred dollars in aid of the Entomological Society for the year ensuing, on the following conditions :—That the Society continued to publish the *Canadian Entomologist* ; that it furnish a report to the Council on insects injurious or beneficial to agriculture ; and that a small cabinet of insects illustrating the various orders be made and placed at the disposal of the Council. These conditions were gladly complied with and faithfully carried out, and the report consisting of sixty-four pages, illustrated with sixty-one cuts, was printed in the report of the Commissioner of Agriculture for that year. During the latter part of 1870, an amendment to the Agricultural and Arts Act was introduced by the Hon. John Carling, then Commissioner of Agriculture for Ontario, which provided for the incorporation of the Society under the name of "The Entomological Society of Ontario," with a yearly grant of five hundred dollars from the public funds of the Province, on condition that the Society prepare annually for the Commissioner of Agriculture a report on the subject of insects injurious or beneficial to the farm and garden, with the understanding also that the *Canadian Entomologist* should be continued. During the period which has since elapsed, the Ontario Government have recognized the value of the service rendered by the Society to the agricultural interests of Ontario, by increasing the grant several times, until it now amounts to one thousand dollars a year. The liberality of the Government has greatly stimulated the work of the Society.

The practical or economic aspect of this work has been presented to the public mainly in the series of thirteen annual reports, which have been submitted to the Commissioner of Agriculture by members of the Society, and published in the Commissioner's report. In these publications the insects injurious to the various field crops and fruits have from time to time been discussed, together with the remedies which have been suggested for their destruction. The value of these reports is indicated by the demand which has arisen for them, owing to which it has been found necessary to greatly increase the number of copies issued. Some of those belonging to the earlier years are now quite scarce and difficult to obtain. They have been most favourably noticed by the press in all parts of America and in Great Britain, and thus the good work has been brought prominently into notice. If we contrast the amount of information now available to our farmers and fruit growers on the nature and life history of destructive insects and the best methods of subduing them with our knowledge on this subject fifteen years ago, the vast progress made will at once be recognized, and it is to the unselfish labours of the members of our Society that much of the credit for this is legitimately due. I have no hesitation in asserting that the value of the information thus distributed has returned to the country by the losses which have been lessened or prevented many times the amount which has been granted to the Society during the past twelve years from the public moneys of this Province.

The *Canadian Entomologist* has been regularly issued, and is now in its fifteenth volume. The volumes published have contained a vast amount of useful scientific information, which by its wide dissemination has been one of the chief factors in the progress of entomology in this country. The work of our Society in this department has attracted much attention abroad, and our journal has been sought after by many of the learned societies in Great Britain, the United States, France, Germany, Russia and Sweden, and regular exchanges of our publications with their's on equal terms effected. Thus from small beginnings the Entomological Society of Ontario has come to be recognized as one of the important aids to scientific progress. It is much to the credit of Ontario that for some years the *Canadian Entomologist* was the only regularly issued periodical specially devoted to the interests of entomology on the American continent, and that it still commands the contributions of many of the most distinguished entomologists in all parts of the country.

During the period of the existence of the Society a large collection of insects has been made, a good library accumulated, and an excellent working microscope and other facilities for the study of insects provided, all of which are readily accessible here to any of our members who may reside in London, or who may visit us from a distance. The collection shown, at the request of the Government, at the Centennial Exposition in Phila-

delphia, in 1876, attracted much attention ; and was admitted by all to be the most complete exhibit of North American insects ever brought together ; the Society was awarded a gold medal on that occasion. Last year a request was made by the Minister of Fisheries for the Dominion of Canada that our Society would prepare and exhibit a collection of such insects as were injurious to fishes as well as those which served as food for fishes, to be sent with the Canadian exhibit to the great International Fisheries Exhibition now being held in London, England. The arrangement of this collection was undertaken by our worthy Secretary, Mr. E. Baynes Reed, who completed the work and sent forward in due season forty cases of Canadian insects.

The large collection of carefully determined specimens in the cabinets in the Society's rooms in London, has also served a valuable purpose, as a collection of reference where collectors from all parts of the Province can name their insects, and where all the books and appliances which can aid this work are ready at hand. As our knowledge of the insect forms found in our country increases, classified lists of their names are published by the Society, for the purpose of aiding students in arranging their collections, and also indicating the work which has been accomplished.

During the past year a most complete and systematic index has been prepared by our Secretary, Mr. E. Baynes Reed, to the full series of our thirteen annual reports, by means of which the information they contain in reference to any insect or subject may be referred to with little trouble or delay. This has greatly enhanced the value of these reports, and opened the eyes of all to the vast fund of information they contain ; the results amply repay the attendant labour and outlay of this compilation, and nothing would do more to add to the value of the *Canadian Entomologist* than the publication of a similar general index to the fifteen volumes of our monthly now completed. I trust our esteemed Secretary may be induced to continue the good work in this direction.

We have not been afflicted with any very formidable invasion of insect enemies during the past year. At the opening of the season the apple-tree aphis which is generally common, was in some districts unusually abundant, and attracted some attention. The injury inflicted by them on the apple-buds was not serious, and in a few days the buds expanded, when the lice became scattered over the opening foliage and caused no further apprehension.

Later on the tufted caterpillar of the white-marked tussock moth *Orgyia leucostigma* appeared in force, having hatched in multitudes from the numerous masses of eggs attached to the twigs and limbs of various trees. These eggs are usually partly sheltered by a dead leaf or leaves firmly adherent. The mass contains from 300 to 500 white eggs imbedded in a frothy gelatinous substance, is of a grayish white colour, with a nearly smooth convex surface, while there is usually attached to the mass the empty grey cocoon from which the parent moth escaped. The eggs hatch about the middle of May, when the young larvæ at once begin to devour the leaves of the tree on which they are placed, rapidly increase in size, and when full grown present a handsome appearance. Their bodies are more than an inch long, of a bright yellow colour, with a red head, three or four cream-coloured tufts set in a black stripe along the back, two long black spreading plumes extending forward on the anterior part of the body, and one at the opposite extremity. By gathering the clusters of eggs during the winter when they are easily seen, the depredations of this insect may be prevented ; but should this simple measure from any cause be omitted, the larvæ may be destroyed on the trees by syringing the foliage on which they are feeding with Paris green and water in the proportion of a teaspoonful of the poison to a pailful of water. This caterpillar is a very general feeder, and occurred this year on almost every species of deciduous tree, especially on street trees, and in lawns and parks, as well as in orchards.

The clover seed midge to which the attention of farmers of this Province was first called in the Annual Report of our Society for 1881, continues to extend its sphere of operations, and many complaints are being made of the failure of the crop of clover seed from this cause. The perfect insect is a two winged fly, about the size and having much of the general appearance of the wheat midge. By the aid of a long ovipositor the insect pushes her minute eggs down the flower tubes in the young clover heads, and when hatched the tiny red larvæ devour the seed. In districts where this insect has fairly established itself

there seems to be but one method of subduing it, and that is to starve it out by ceasing to grow clover for a year or two, a large proportion of the larvæ may be destroyed by cutting the clover earlier than usual, just as it is coming into bloom, when being only partially developed most of them would perish. The greater danger arises from the possibility of their being distributed by the use of infested clover seed. The insect passes the winter either in the larval or pupal state, and in both of these conditions is often found amongst clover seed, and if sown with the seed the insect is placed amid conditions most favourable for its development. Seedsmen should carefully examine their seed before offering it for sale, and farmers should exercise similar caution before purchasing. The insects are very small but are much larger than the individual seeds, and if a small quantity of the clover seed is passed through a fine sieve these insects, if present, will be found along with the coarser weed seeds with which clover seed is so often contaminated.

The maple Egerian known also as "the legged maple borer" *Ægeria acerni* has prevailed during the past year in the neighbourhood of London to an alarming extent, to the serious injury of some of our shade trees. These insects which pass the winter in the larval state under the bark of the maple trees change to chrysalids early in June, and about the middle of that month they protrude themselves from the bark to the extent of about half an inch, when in a very short time the mature insect escapes, leaving the empty chrysalis behind it. This is a very pretty clear-winged moth, resembling a wasp, which when its wings are spread will measure about three quarters of an inch across. The transparent wings are adorned with bluish-black markings, the head is orange, the thorax yellow, and the abdomen bluish black banded with golden yellow. The female lays her eggs on the bark of the trees, preferring the red maple *Acer rubrum*, although the other varieties of maple are also more or less affected. In a few days small larvæ hatch from the eggs, which penetrate through the bark and feed upon the inner portion and sapwood of the tree, making an irregular cavity which is packed with the castings of the larvæ mixed with minute fragments of wood. When full grown it is about three quarters of an inch long, with a small yellow head, and a white or yellowish white body, which is darker on the hinder segments. Where the larvæ are safely lodged under the bark no remedy but the knife will reach them, but the moths may be prevented from laying their eggs by coating the bark with a mixture of soap and strong solution of washing soda, the mixture being made about the consistence of ordinary paint, and applied to the trees in the middle of June.

Within the past two or three years Paris green mixed with water in the proportion of a teaspoonful to a pailful of water has been recommended as a remedy for the codling moth, the mixture being freely applied to the apple trees with a syringe or force pump soon after the fruit has set. The results of experiments conducted during the past season go far towards establishing the value of this remedy, the number of wormy apples having been materially lessened on the trees so treated. In my own experiments where the mixture was applied to alternate trees, the proportion of wormy fruit in some instances on the trees syringed seemed to be nearly the same as on the adjoining trees which were not treated; the fruit on both being less wormy than usual, while in other instances there was a very unusual freedom from the apple-worm. Other experimenters claim far more decided results. So promising a measure, where so much is at stake, well deserves a most extensive trial. The mixture should be applied while the fruit is quite small and before the stem is bent with its weight, then as the eye or calyx of the fruit on which the codling moth usually deposits her eggs points upwards, it will more readily catch some portion of the spray. A very minute quantity lodged in the little cavity and drying there would leave a trace of Paris green sufficient to destroy the newly-hatched larvæ as it begins to eat its way into the fruit.

The meeting of the American Association for the Advancement of Science was held this year at Minneapolis, where I had the honour to represent our Society. The attendance of entomologists, although good, was scarcely so large as last year. Since the adoption of the new Constitution, whereby the sub-section of Entomology has been merged into the section of Biology, the entomologists have greatly felt the need of opportunities of bringing up for informal discussion many questions suggested by the experience of those present, matters which could not well be brought before the general session. To

meet this need the Entomological Club of the Association has been reorganized, several interesting meetings were held, the proceedings of which have been reported for the *Entomologist* and Annual Report.

We have had occasion to mourn the loss by death during the past year of several well known entomologists, some of whom were active members and valued contributors to our Journal. The names of Zeller, Glover, and Chambers are familiar to you all; these have passed away. Our list also includes the names of Dr. Bailey, of Albany, N.Y.; Professor Croft, late of Toronto, and Charles Arnold, of Paris, Ont. Prof. P. C. Zeller, the eminent German lepidopterist, whose labours in the micro-lepidoptera have given him a world-wide reputation, died at his home near Stettin at the ripe age of seventy-seven years. Dr. Jas. S. Bailey, of Albany, N.Y., a zealous worker among the lepidoptera, and an occasional contributor to the *Entomologist*, passed away on the 1st of July. Prof. Townend Glover, who for so many years held the position of Entomologist to the Department of Agriculture in Washington, died on the 8th of September. Probably no man ever worked more persistently and continuously than he. A good draughtsman and an excellent engraver, it was his delight to make figures of every native insect brought under his notice. Our library has been enriched by his beautiful works, and the wonder is how any man in one short life could have done so much. His health having failed, he retired several years ago from his official position and active work, and spent his last days in a quiet home in Baltimore. V. T. Chambers, of Covington, Kentucky, one of our most regular and valued contributors, died on the 7th of August, his fifty-second birthday. To him we are largely indebted for the knowledge we possess of our micro-lepidoptera, a field in which he ardently laboured, and in which he was a worthy successor to the late Dr. Clemens; his loss will be much felt and sincerely deplored. Charles Arnold, of Paris, Ont., although not an active worker in the entomological field, was a close observer of the habits of insects, especially such as are injurious to agriculture or horticulture. He had long been a member of our Society, was with us at our annual meeting held here two years ago, and took part in our discussions. He died on the 15th of April, in his sixty-sixth year. Prof. Croft, long well known throughout Canada as an eminent chemist, always took an active interest in entomology, he took a prominent part in the organization of our Society, was its first president, and always manifested the greatest interest in its prosperity. He died at Hermanitas, Texas, on the 28th of April, at the residence of his son, after a brief illness, aged sixty-four years.

Who will press to the front and fill the vacant places in our ranks? One by one our busy workers pass away, but our favourite branch of natural science still lives, and will continue to assert its increasing importance, and to confer its benefits on all succeeding generations.

I have the honour to be,

Yours very sincerely,

WM. SAUNDERS.

MR. JAMES FLETCHER, of Ottawa, then read the

REPORT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO TO THE ROYAL SOCIETY OF CANADA.

To the President and Members of the Royal Society of Canada.

GENTLEMEN,—In response to the invitation received by the Entomological Society of Ontario to send a delegate to the meetings of the Royal Society of Canada, the Council of Management gladly avail themselves of the privilege so accorded them of being represented on this occasion.

As their delegate, I shall endeavour to submit for your information, in as brief a manner as possible, some of the main features relating to the origin, and progress, of the Society, now so well known as the Entomological Society of Ontario. It was organized

in 1863, under the name of the Entomological Society of Canada, by a few naturalists living in different parts of the Provinces, who met together at Toronto for this special purpose. Its membership at first was only sixteen, and this number included all those then known to be interested in the study of insect life in Canada. From this small beginning the Society has steadily increased, until its membership now reaches upwards of five hundred.

The benefits of organization and united effort were soon manifested by the rapid accumulation of valuable facts relating to scientific and economic entomology. Formerly this material was, from time to time, published in the pages of the *Canadian Journal*; but the increased interest in the work of the Society, and its larger membership, rendered it necessary in a few years to establish a periodical of its own, entirely in the interests of Entomology. On August 1st, 1868, appeared the first number of *The Canadian Entomologist*, a monthly periodical which has, from that time forward, been regularly issued, and which was for some years the only publication on the continent of America, devoted solely to this important branch of natural science. It has now reached its fifteenth volume. From the outset its pages have been almost entirely filled with the records of original work; and during its existence it has been the means of disseminating a vast amount of scientific knowledge which has been of benefit, not only to Canada but to the world at large. In this connection it may not be out of place to quote the opinion of one of the leading American entomologists. Prof. Grote, of New York, in his late work on the Noctuidæ, when enumerating the sources of information of value to entomological students, speaks of the organ of our Society in the following complimentary terms:—

"The treatise of Dr. Harris, which has become classical on its subject, did much towards creating a general interest in Entomology. But the publication of the *Canadian Entomologist*, a journal aided pecuniarily by the Ontario Government, and owing its success chiefly to the unselfish labours of Mr. William Saunders, has assisted the progress of Entomology in America probably more than any one other similar undertaking."

The work of our Society has also been favourably commented upon abroad, and a regular system of exchange of publications has been established with many of the important learned societies of Europe. In addition to the good work done by the issue of the *Canadian Entomologist*, collectors have been materially aided in their studies by the classified lists of the different orders of Canadian insects, which have been published as the material for the purpose was gathered together.

The extensive collection exhibited by the Society at the Centennial Exhibition at Philadelphia attracted much notice, and was admitted by all who saw it, to be most creditable to Canada. At the request of the Dominion Government a similar collection has been sent to England as part of Canada's contribution to the International Fisheries Exhibition.

Beyond this purely scientific work, the Society has, in a series of thirteen annual reports on insects injurious and beneficial to agriculture, given to the farming community a large amount of useful information.

The Government of Ontario, recognizing the good work thus accomplished, incorporated the Society as the Entomological Society of Ontario, under the "Agriculture and Arts Act," in 1870; and at the same time gave material aid by allowing a liberal annual grant from the public funds.

In view of the necessity for the constant interchange of specimens between students in every department of Natural History, in order that, by comparison of other forms, their studies may be thorough; the Entomological Society of Ontario respectfully suggest that the Royal Society of Canada should use its influence to secure a more liberal interpretation of the postal regulations, with reference to the exchange of specimens between students in Canada and those in the United States and Europe, particularly in the closely allied sciences of entomology and botany.

And it would also further suggest that a representation be made to the Government to the end that arrangements be made whereby scientific bodies may be permitted to import, free of duty, any engravings, woodcuts, lithographs, electrotypes, or other illustrations which they may require for their publications.

The members of the Entomological Society of Ontario have learned with much

pleasure that the Royal Society has already taken some steps towards the establishment of a national museum, and believing that such an institution would very appreciably assist the whole cause of science in Canada, they take this opportunity of assuring the Royal Society that they will be pleased to help in every way in their power, towards this end, by collecting specimens or otherwise.

Signed on behalf of the Council,

J. Fletcher,

Delegate.

Ottawa, May, 1883.

On motion duly carried, the report was received and adopted, and Mr. Fletcher was unanimously re-elected the representative from the Entomological Society to the Royal Society.

ELECTION OF OFFICERS.

The election of officers then took place, when the following gentlemen were duly elected :—

President.—Wm. Saunders, London.

Vice-President.—James Fletcher, Ottawa.

Secretary-Treasurer and Librarian.—E. Baynes Reed, London.

Council.—Rev. C. J. S. Bethune, M.A., Port Hope ; Rev. T. W. Fyles, Levis, P.Q. ; W. H. Harrington, Ottawa ; John M. Denton, London ; J. Alston Moffatt, Hamilton.

Editor "Canadian Entomologist."—Wm. Saunders.

Editing Committee.—Rev. C. J. S. Bethune, J. M. Denton, E. Baynes Reed.

Auditors.—H. P. Bock and W. E. Saunders, London.

REVISION OF THE SOCIETY'S PRINTED LISTS OF INSECTS, ETC.

On the motion of Rev. C. J. S. Bethune, duly carried, it was resolved that the Society should, as soon as possible, publish a revised list of the Canadian Diurnals ; adopting as a basis the list and classification of Mr. W. H. Edwards, of West Virginia. And that the Society should also publish additional lists of such moths as have been found to be Canadian, and are not contained in the Society's existing lists.

In view of the desirability of the publication of the description of hitherto undescribed larvæ, and with a view to aid therein, the President and Vice-President, Rev. C. J. S. Bethune and W. H. Harrington, were appointed a committee to prepare blank forms for the use of members in describing larvæ ; the Society being of the opinion that following the practice of Westwood and Stainton, the body should be considered as consisting of thirteen segments, the head being the first.

The Rev. T. W. Fyles then read an interesting paper on "Observations on Form and Colour as Exhibited in Insect Life."

A. A. A. S.

The President submitted a report of the proceedings of the American Association for the Advancement of Science, held at Minneapolis in August last, which he attended as the representative of the Entomological Society of Ontario.

DISCUSSION ON MISCELLANEOUS ENTOMOLOGICAL SUBJECTS.

Mr. Fletcher exhibited a borer found by him injuring maple, the insect being a small moth belonging to *Hepialus* or some closely allied genus. This insect was new to the members.

Rev. Mr. Bethune stated that he had found in a large burrow in an oak tree, the empty pupa case of a species of *Cossus*.

Mr. Harrington had also found this insect quite common on the oak, and had frequently seen the empty pupa cases protruding from the bark.

Mr. Fletcher reported that he had found *Cossus centerensis* common about Ottawa on the Balm of Gilead tree *Populus balsamifera*; the pupa is usually extruded from the bark about four o'clock in the afternoon; he had frequently seen them at this time of day working gradually out; the imago usually escapes within an hour after the appearance of the pupa. He also reported finding *Buprestis fasciata* common on poplars, and had found a larva in poplar wood which he thought, from its appearance, might belong to that species.

Mr. Harrington said that he had lately found the larvæ of a very small fly *Cecidomyia robiniæ* on locust trees about Ottawa; these larvæ turn down the margins of the leaves and live within the enclosure thus formed.

Mr. Fletcher had found the stems of sunflowers much bored into by some insect, and exhibited a larva which he had taken boring into the stem of a lily, *Lilium Canadense*.

Mr. Reed exhibited a larva which he had taken recently feeding on oak; it evidently was a species of *Smerinthus*, but did not seem to correspond to any hitherto described larva of this genus to which he had been able to refer.

Mr. Saunders made some reference to the manner in which the eggs of the Round-headed Apple tree borer, *Saperda candida* are placed. He had until lately held the opinion, in common with other entomologists, that the eggs are laid on the surface of the bark of apple trees near their base, but he had recently received from a correspondent, Mr. C. G. Atkins, of Manchester, Maine, specimens of the eggs deposited in young apple trees, from which it was quite evident that the beetle bores into the bark and deposits her eggs under the surface.

Mr. Fletcher said he had raised a brood of the larvæ of *Smerinthus excæcatus*, and found it to feed readily on *Populus balsamifera*, and also on *Populus alba*, the latter known as the silver abele tree; the larvæ varied very much in colouration; hitherto this insect has been supposed to feed only on apple, plum and wild cherry.

Mr. Saunders stated that he found the larvæ of *Papiolio turnus* this season on a new food plant *Magnolia acuminata*; as many as forty or fifty specimens were found on a single tree, varying in size from the newly-hatched to the full-grown larva, all feeding together; eggs were also found at the same time and place.

Mr. Fletcher reported finding the larva of *Darapsa versicolor* feeding on swamp loose-strife *Nesæa verticilata*; he had bred a single specimen two years in succession; it is curious to note that this plant grows in the water, and being herbaceous, decays and becomes submerged during the autumn and winter months; in these instances there was no favourable pupating place nearer than the shore, so that the larva would have to swim ashore, unless it formed its coccoon among the leaves and these drifted to land.

Mr. Reed exhibited and reported the larvæ of *Notodonta albifrons* Sm. and Abb. as common in London on the maple, he had also observed them recently on the elms in Toronto and Montreal; other members had found them generally common this season on the oak.

Mr. Saunders had found the larvæ of *Papilio cresphontes* on the wafer ash *Ptelea trifoliata*, also on the prickly ash *Zanthoxylum Americanum*; at this late period of the year (September) the larvæ may be found quite small. Query, Do these perish from early frost? If not, how do they pass the winter?

The meeting then adjourned to meet next morning at 9.30 a.m.

Thursday Morning, October 4.

The meeting opened at the Society's rooms at 9.30.

The question of the use of Paris green for the codling worm of the apple *Carpocapsa pomonella* was discussed, and while the members concurred in the desirability of testing

this remedy very fully, they recommended that due caution should be used in preparing the mixture not to make it too strong, one teaspoonful of the poison to a pailful of water being sufficient ; if used much stronger than this it is apt to injure the foliage.

An interesting communication was read from Mr. J. Alston Moffatt, of Hamilton, on the pupa of *Calopteron reticulatum* ; he had found specimens under the bark of an elm stump, curiously arranged in regular rows. Mr. Harrington had also observed the same species, and remarked that Drs. Leconte and Horn, in their new classification of coleoptera, referred to these curious groups of pupæ.

Mr. Fletcher had found *Mamestra picta* very abundant at Ottawa on cabbage, carrots, and many wild plants.

Mr. Harrington remarked that *Lycomorpha pholus* had been very common in the vicinity of Ottawa this season, he had seen hundreds of them ; had also found *Œdipoda corallina* Harris quite common in oat fields.

Rev. Mr. Fyles reported the Currant Worm *Nematus ventricosus* as being very abundant at Levis, P.Q., where the bushes had been almost destroyed by them. He also stated that much injury had been caused to the tamarack trees *Larix Americana* in Bury and the neighbouring townships, by a species of saw fly, the same, probably, as that which has caused so much injury in Maine and the other eastern States, *Nematus Erichsonii*.

Mr. Harrington informed the members he had found *Xyphidria albicornis* boring into maples, chiefly young trees where the bark was thin ; he had observed them ovipositing from the middle of June to end of July. The ovipositor is short ; he found in one instance a tree thoroughly riddled by these borers, they having penetrated directly into the wood.

The members having spent some time in examining interesting insects in the Society's collection, as well as those brought to the meeting, and also having availed themselves of the opportunity of reference to many of the valuable books in the Society's Library, brought to a close a most interesting and profitable session.

MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

A meeting of entomologists was held, according to announcement, on the 15th of August, 1883, at Minneapolis, Minn., in the University Buildings. There were present during the meeting the following : Prof. S. A. Forbes, Normal, Illinois ; Prof. C. V. Riley, Washington ; D. S. Kellicott, Buffalo ; Herbert Osborn, Ames, Iowa ; O. S. Westcott, Chicago ; Wm. Saunders, London, Ontario ; Dr. and Jenny Hoy, Racine, Wisconsin ; C. L. Herrick, E. W. Claypole, Prof. E. S. Morse, C. E. Bessey, E. H. Canfield ; Miss Mary E. Murtfeldt, Kirkwood, Mo. ; Mrs. M. B. Moody, Buffalo, N.Y. ; Thomas S. Roberts, Minneapolis, Minn., and others.

S. A. Forbes read a letter from J. A. Lintner, regretting his inability to be present, and after some remarks by Mr. C. V. Riley as to the prevailing sentiment at the meeting of entomologists last year of Montreal, it was decided to reorganize the Entomological Club of the A. A. A. S., under the rules as hereinbefore recorded.

On motion, the following officers for the ensuing year were then elected :—

President.—D. S. Kellicott.

Vice-President.—Herbert Osborn.

Secretary.—O. S. Westcott.

A communication was read from Mr. W. H. Edwards, of Coalburg, W. Va., giving interesting recent experience in the rearing of butterflies of the following species : *Papilio rutulus*, *P. zolicaon*, *Colias barbara*, *C. amorphæ*, *Melitaea chalcedon*, *M. phaeton*, *Lycena melissa*, *Parnassius smintheus ?* and *Argynnis coronis ?* The author stated that he had bred *rutulus* and *zolicoan* from the egg, that *rutulus* is constantly distinguishable from *turnus*, at least after the first larval stage ; and that *zolicaon* is closer to *asterias* than to *machaon*. He had also reared from the egg *Colias amorphae*, and was inclined to the opinion that it was distinct from *C. eurydice*. Opportunities had been afforded of study-

ing all stages of *M. chalcedon*, with *M. phaeton* colonizing on the same plant, so that the habits of the two species could be compared.

Mr. Edwards has also raised *Lycaena melissa* from egg to chrysalis, and finds that the larva in the last stages has similar organs to those of *Pseudargiolus* on the tenth and eleventh segments, and that ants are attracted in the same way by the sweet fluid they exude. Over 100 eggs of *Parnassius*, either *smintheus* or something close to it, have been obtained from West Montana. As to butterflies, the author stated that he had never seen them scarcer than during the past year. An interesting discussion followed this paper, in which several members took part.

Prof. Riley offered some "Notes on *Pœdisca Scudderiana*," and exhibited plants of Solidago containing the larvæ of this species, and made some remarks on its habits which went to reconcile the published conclusions and differences between himself and Dr. Kellicott, and to show that while the insect is commonly a gall maker, it was also, exceptionally, an inquiline. The specimens showed that the habits of the insect were variable, and the larva was either a leaf-crumpler, living in a bunch of curled terminal leaves held together by a silken gallery, a stem-borer, without causing any swelling, or the maker of a more or less perfect gall. He had also found it as an inquiline in the gall of *Gelechia gallæsolidaginis*, the gall of which was always distinguishable from that of the Pædisca; among other things by the burrow of the larva always being traceable from the blighted tip of the plant, whereas the Pædisca larva lived at first in the tip, and bored in at the side. Mr. Kellicott's observations were accurate so far as they went, but did not take into account the variation in habit. Mr. Riley had watched these larval habits during the present year from the time of hatching, and had concluded that the insect combined, in varying degree, the four characteristics of gall-maker, leaf-crumpler, stem-borer, and inquiline. The larvæ living in the crumpled leaves later in the season had not been reared to the imago, but he had made comparisons of the young larvæ and found that they were exactly alike, but they showed considerable modification as they developed, especially after the last moult. Several other micro-lepidopterous larvæ bored in the stems and lived among the leaves of Solidago; while another species, yet unbred, made a gall similar to that of Pædisca; but all the other larvæ known to him were easily distinguished from Pædisca.

Mr. D. S. Kellicott said he felt sure his observations as reported in the paper referred to were correct, and he was glad to know that both his own conclusions and those of Mr. Riley could be thus harmonized. It would seem he had not carried his observations far enough to discover that all the larvæ of *Scudderiana* fed at first in the terminal leaves. Late in the fall he had often taken from the terminal leaves the mature larvæ referred to by Mr. Riley, but had so far failed to obtain the imago from them. He had some doubt still of its being identical with *P. Scudderiana*.

Prof. Riley also called attention to the life habits of *Helia americalis*, which he finds in the larval state to feed in the nests of *Formica rufa*. So far as he knows, this is the first lepidopterous insect known to develop in ants' nests. He also gave his experience in rearing *Arsame obliquata* during the past two years, and exhibited specimens in different stages of development. The eggs are laid in curious broadly conical or plano-convex masses enveloped in hair, and a cream coloured mucous secretion, which combined look much like spun silk on the inside, and on the outside like the glazed exudation of *Orgyia leucostigma*. The larva, which is pale at first, but dark in its later stages, bores into the stems of Saggittaria and Nelumbium, and is semi-aquatic, the last pair of spiracles being exceptionally large and dorsal. There are two annual broods, the second hybernating as larvæ in moss and decaying stumps near the water. The moth shows great variation, and the summer brood is on the average not much more than half as large as the spring or hibernated generation, and generally much paler.

Mr. D. S. Kellicott said that he had bred this moth at Buffalo, N.Y., where it was very abundant, and he had found it associated with another species, an account of which he promised to give at some future session.

The meeting then adjourned to meet at 2 p.m., the following day.

Wednesday, August 15th, 1883.

The members of the Club met at 2 p.m., the President in the chair.

A paper was presented by Prof. S. A. Forbes entitled "Memoranda with regard to the contagious diseases of caterpillars and the possibility of using the virus of the same for economic purposes." The writer had adopted the results of Pasteur's discoveries in relation to the disease affecting silk-worms as the foundation for his researches. M. Pasteur some time since demonstrated the constant presence of a parasite in the intestines of silk-worms affected by this disease, which has at times threatened the silk industry in Europe. This parasite was not only the indispensable accompaniment of the disease, but is its originating cause and the means by which it can be and is conveyed to other individuals of the species.

By placing healthy silk-worms in contact with those suffering from the disease, by sprinkling them with the dust of excreta derived from the latter, or by moistening their food with an infusion of the fermented mulberry leaves upon which these had fed, he proved the possibility of conveying the disease from one subject to another.

In pursuance of this Prof. Forbes has witnessed instances of epidemic disease in different species of insects, as for instance in the Chinch Bug and the Yellow-necked Caterpillar, which disease was invariably dependent upon some form of bacteria or micrococcus, possible of cultivation and reproduction, and by means of which the disease can be indefinitely conveyed. These facts give rise to the suggestion that the specific micrococcus or bacteria causative of these fatal diseases may be used for the infection and destruction of insect pests.

Prof. Osborn called attention to the fact that he had noticed *Bombus Pennsylvanicus* inhabiting a deserted wren's nest, situated under the roof of a porch, and at least twelve feet from the ground, it being the first instance he was aware of where they nested away from the surface of the ground.

Mr. D. S. Kellicott had noticed the same or some allied species of *Bombus* inhabiting a mouse's nest in the brace of a barn.

Miss Murtfeldt had also seen them domiciled in a martin's nest.

Dr. Hoy presented for inspection the larvæ, pupæ and imagines of *Plusiodonta compressipalpis*. He had watched the insect through its transformations and had noted that through its early larval stages its prevailing colour was a pea green varied with uniformly placed black spots, which increased in number with each successive moult. Only during the last stage of its larval life was the insect usually noticeable by other than professional eyes; since then its colour was reddish brown ornamented with creamy white. *Menispermum Canadense* was its usual food plant. The cocoon was formed by first building two nearly parallel walls and then uniting them at the top. Some larvæ which had been displaced after beginning to pupate, had apparently become exhausted, or their teeth had become loosened in anticipation of their approaching new condition, and they were willing to accept bits of paper held to them on a pin, with which they finished the cocoons already begun. The species in Racine cannot be more than two-brooded. The larvæ are not distinguishable from those of Geometrid moths, as they are true loopers. Their transformations in some particulars were exceedingly prompt.

Prof. Riley stated that he had known certain moths, notably *Leucania unipuncta*, to go through their entire transformations in fourteen days, and in some instances in only ten days.

Prof. Herrick made enquiry as to what are sometimes known as frost-flies.

Mr. Kellicott called attention to a monograph by T. Rymer Jones, and one by E. Ray Lankester, to be found in the Quarterly Journal of Microscopical Science, and stated that the species common at Buffalo was *Corethra plumicornis*.

Prof. Forbes had noticed the larvæ of *Corethra* abundant in the stomachs of fishes.

Adjourned to meet at the call of the President.

Friday, August 17th, 1883.

The Club met at the call of the President at 2 p.m., in the room in the University assigned to the use of Section F.

Prof. Osborn presented a paper on the Phytoptera, a group of insects formerly regarded as the larvæ of mites, the individuals of which are so small as to be invisible to the unaided eye. Reference was made to one form found on the soft maple, which occurs as a small swelling on the upper surface of the leaves, containing sometimes a number of these insects, at other times only two or three. One species affects the ash, occurring on both the upper and lower sides of the leaves, one occurs on elm and one on box elder, that on the last named tree having a woolly structure beneath the surface. This paper was illustrated by a very interesting series of carefully mounted microscopic specimens.

Prof. Riley remarked that the species which occur in Europe had been well worked up there, and that in studying our species the work already done on this group should be carefully examined, so as to avoid the making of synonyms. He considered that the hybernating habits of these mites was one of the most interesting discoveries which had been made in reference to them, and he hoped that the attention of investigators would be especially turned to this point. He referred also to additional species which occur on the plum, cherry and linden.

Mr. Osborn said that the Phytoptis on plum was not common in the neighbourhood of Ames, although he had found it occasionally; that on the maple is particularly abundant.

Mr. Saunders referred to the unusual amount of black knot seen in Ontario this year, especially on the common red cherry trees, and stated that he had scarcely seen a specimen of this fungus on the cherry which had not one or more specimens of the plum curculio feeding on the interior.

Mr. Riley remarked that the black knot had been very common of late all through the northern portions of New England.

Mr. Kellicott had observed it as very common in western New York, and had also noticed that a large proportion contained larvæ.

Mr. Osborn stated that he had observed the larvæ of *Gortyna nitela* boring in young twigs of ash, and had noticed many dead twigs from this cause. He had failed to rear the imago from them on account of parasites; he had also observed the same species feeding externally upon the leaves of the common plantain.

Miss Murtfeldt had found the same insect in twigs of the maple, *Acer dasycarpum*.

Prof. Riley stated that it had occurred also in peach twigs and in the stalks of wheat; also in *Ambrosia artemisifolia*, where it enters from the sides.

Prof. D. S. Kellicott offered the following notes on three lepidopterous stem-borers.

First, *Arzame obliquata*.—Prof. Riley has referred to the habits of this species at a previous session of the Club, and I shall refer only to a few points. As I said yesterday, I feel sure that in Buffalo, N.Y., it is single-brooded. The eggs I have not found, but the recently hatched larvæ I have found feeding upon the flowers about the 12th of June. It occurs in *Typha latifolia*, rarely in *Sparganum*. I have not found it in *Sagittaria* or *Nuphar*. Mr. Riley has referred to the large posterior pair of spiracles placed dorsally. On account of this structure it may remain a long time swimming at the surface. I have had these larvæ confined in a pail of water for five or six hours without apparent injury. When removed from their galleries and dropped into the water, they sink to the bottom and remain there for a considerable time; then rising to the surface, they swim about with a snake-line motion. In the autumn they leave their food plants and bury themselves in the earth, or crawl into old wood, etc. They pupate in May.

Second.—The second larva is that of a *Nonagria*, which I have called *Nonagria subcarnea*. This species is also single-brooded; the larvæ are found boring the stems of *Typha* early in the summer, forming galleries in the stems; it may be readily distinguished from those of *A. obliquata* by the lighter colour, often carneous, and by the fact that the last pair of spiracles is not sub-dorsal. I have found it rarely in *Scirpus*. It appears not to be so nearly aquatic, and probably does not pass from one plant to another through the water, or mud. When the time comes for pupation it prepares a

pupa-cell above the water line and changes in the bottom of the same, with the head upwards. It leaves the epidermis, closing the place of exit, and the freed moth breaks through this with its clypeal spine when it escapes, leaving the pupa skin in the cell. The elongate pupa has a very stout, blunt clypeal spine. The moth appears in August. It is known to abound throughout western New York, central Michigan, and eastern Wisconsin.

Third.—The larva of a *Chilo* (?) bores the stems of *Scirpus*. Its habits are similar to those of a *Nonagrian*. It passes the winter in the old stems, and after the new ones appear it bores into them, passes below the water line, and lives low down in the stem. It is mature late in June, when it forms a pupa cell with its place of exit above the water. The pupa breaks up the epidermis left by the larva, covering the place of escape, but does not force its way out before disclosing the moth, in a manner similar to that of the Ægerians and others. It is enabled to do this by means of clasps on the abdominal rings, and the sharp or pointed clypeus.

Mr. Riley, in commenting on Dr. Kellicott's communication, said that he had been greatly interested in the facts presented, and especially as to the pupation of the *Nonagria*. As to the difference in the clypeal projection in the two pupæ exhibited, he thought it might be sexual, as in all cases where the clypeus was produced sexual difference occurred, the greatest development being, so far as he had observed, not in the male but in the female. He had recently called attention in the *Naturalist* to the correllation between the produced clypeus and the horny, exsertile ovipositor, and the fact that they indicated *endophytous* larval habit. The various methods of imaginal exit in stem-boring lepidoptera, and the structural modifications that resulted, were most interesting to the philosophical entomologist. In some species, as in the *Nonagrian* here mentioned, the clypeal point on the pupa seemed merely a consequence of the necessary point in the imago, the pupa remaining in its burrow and the imago boring out. In others, as in *Prodoxus decipiens*, the similar clypeal point on the pupa permitted it to partly bore out of the stem and thus release the imago, which had no homologous point, but an unarmed head. In some borers the larva prepared a little door which the imago easily pushed open, the pupa remaining inactive within its prison ; while in others, closely related, the pupa did the work by forcing itself partly out. There could be no question of the digoneutic nature of *Arsamæ obliquata* at Washington, and none as to its variability as illustrated by his specimens, *vulnifica* and *melanopyga*, being doubtless but forms of it.

Some specimens of *Cantharis Nuttali* were exhibited by Prof. Riley, it being stated that in Dakota they were accused of devouring the growing wheat.

The meeting then adjourned, when the members spent some time in informal conversation, and in examining the microscopic specimens illustrating Prof. Osborn's paper.

POPULAR PAPERS ON ENTOMOLOGY.

ENTOMOLOGY FOR BEGINNERS.

By Wm. Saunders, London, Ont.

The Apple-Leaf Crumpler (*Phycita nebulo*).

During the winter there will often be found on apple trees clusters of curious little cases, partly and sometimes wholly hidden by portions of crumpled and withered leaves, as shown in fig. 1. The withered leaves are firmly fastened to the cases by silken threads, and the cases to the bark of the twig on which they are placed. Each case resembles a long miniature horn, wide at one end, tapering almost to a point at the other, and twisted in a very odd manner, as shown at *a* and *b*, fig. 2. It is curiously constructed of silk interwoven with the castings of the artificer, is lined internally with smooth, whitish silk, externally it is rougher and of a yellowish brown colour.

Fig. 1.

Within this curious structure there dwells a small caterpillar, which during the winter months remains torpid, awakening to activity with the warmth of spring. As the leaves of the apple tree begin to expand, the larva draws those that are nearest to it towards the case, and feeds on them, retreating quickly within its case when danger threatens. When full grown it is about six-tenths of an inch long, its body tapering slightly towards the hinder extremity. The head is dark reddish brown, and the body dull greenish brown; the next segment to the head has a dark horny plate above and a flattened blackish prominence on each side. The head and anterior segments are shown at *c* in the figure. On each of the other segments there are several small black dots, from each of which arises a single pale brown hair. When mature, which is usually during the early part of June, it closes the end of its case, and changes to a chrysalis within, about four-tenths of an inch long and of a reddish brown colour, and in about a fortnight the moth appears.

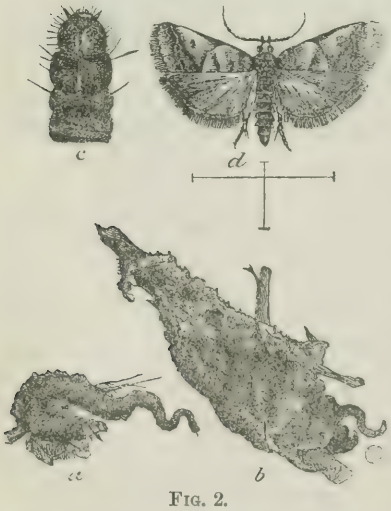


Fig. 2.

When its wings are spread, the moth (*d*, fig. 2) measures about seven-tenths of an inch across. Its fore wings are pale brown, with streaks and patches of silvery white, the hind wings plain brownish white; the under side of both wings paler. There is only one brood in a year. The moths deposit their eggs in the summer, and the larvæ construct their cases and attain about one-third of their growth before winter sets in.

Where the insects are abundant they become very injurious, consuming the young growth as it expands and materially affecting the vigour of the tree. To subdue them, pick the crumpled leaves with the cases from the trees and destroy them.

The Apple-Leaf Aphis *(Aphis mali ?)* Fabr.

This species of Aphis is very common throughout the northern United States and Canada, and has, during the past season, appeared in such numbers in some localities as to excite much alarm among fruit growers. The eggs are deposited by the parent lice in the autumn, about the base of the buds of the apple tree, and in crevices of the bark on the twigs. When first laid they are light yellow or green, but gradually become darker in colour and finally black. During the winter these tiny, oval, shining black eggs may be found with the aid of a magnifyin glass on almost every apple tree.

As soon as the buds begin to expand in the spring, small lice are hatched from these eggs, which locate themselves on the swelling buds and young tender leaves, and inserting their sharp beaks into the tissues, feed on the sap they contain. The lice vary in colour from green to dark greenish-brown, the darker colour prevailing at first, the lighter colour in a few days afterwards. When they are abundant, the buds—especially the blossom buds—are sometimes thickly covered with them, yet it is seldom that any serious injury results from their attack. The growth at this period of the year is so rapid, and the sap circulates through the branches in such abundance, that the comparatively small quantity consumed by these plant lice seems scarcely to be missed. In a few days the young leaves expand, when the insects are distributed over the foliage, and usually attract no further notice.

All the lice hatched in the spring are females, and they reach maturity in ten or twelve days, when they commence to give birth to living young, producing about two every day for two or three weeks, after which the older ones die. The young locate about their parents and mature in ten or twelve days, when they also become mothers as prolific as their predecessors. As the season advances some of the females acquire wings, by means of which they fly to other trees where they found new colonies. In fig. 3 both winged and wingless specimens are shown much magnified. Late in the autumn males, as well as females, are produced, and the work of the year closes with the deposit of eggs as already described. Were it not for the activity of Lady-birds and other useful predaceous insects, which appear early upon the scene and devour multitudes of these lice, they would soon swarm on every leaf of our apple trees and become a source of serious trouble.

Fig. 3.

The Melon Moth *(Eudioptis hyalinata)*, Linn.

A specimen of this beautiful little moth, known also under the name of *Phakellura hyalinatalis*, has been taken by Mr. J. Alston Moffat, in the neighbourhood of Hamilton, the first capture, as far as we know, of this insect in Canada. It is shown in fig. 4. The wings are of a pearly white colour with a peculiar iridescence, bordered with black, and they measure, when expanded, nearly an inch across. The body and legs are of the same glistening white, and the abdomen terminates in a movable brush-like tuft of a pretty buff colour, tipped with white and black. It is very widely disseminated, being found throughout the greater part of North and South America; and is very common in some sections in the Southern States.

The larva, shown also in the figure, is, when mature, about an inch and a quarter long, translucent and of a yellowish green colour, with a few hairs scattered over its body. They are frequently found feeding on melon and cucumber vines, and do not confine their attacks to the leaves, but eat also into the fruit, either excavating shallow cavities on the surface, or penetrating directly into its substance. They spin their cocoons on a fold of

the leaf, as seen in the figure, within which they change to slender brown chrysalids about three quarters of an inch long, from which, in a short time, the perfect insect emerges.

Fig. 4.

The beautifnl figure illustrating this subject was drawn from nature by Mr. Marx, of Washington, and published in Prof. Comstock's Report, as Entomologist of the Department of Agriculture, for 1879. Through the kindness of Dr. Loring, U. S. Commissioner of Agriculture, we have been supplied with an electrotype of it.

The Poplar Dagger-Moth *(Acronycta lepusculina)*. Guenee.

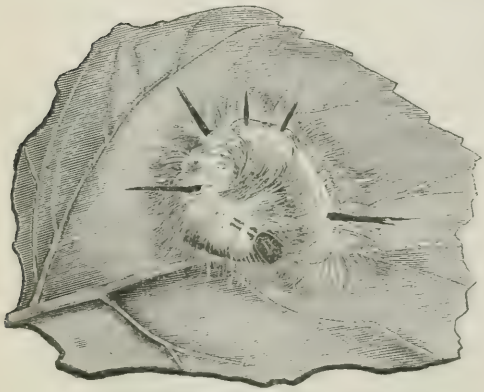


Fig 5, after Riley.

The caterpillar of this moth is often very destructive to poplar trees, and more especially to the foliage of the cottonwood tree in the west. It is, when full grown, an inch and a-half or more in length, with a black head, and its body clothed with long, soft yellow hairs, from amongst which arise along the back five long pencils of black hairs. When at rest it curls itself up on the leaf as shown in fig. 5.

When full grown the caterpillar spins a pale yellow cocoon of silk interwoven with its own hairs, hidden in some sheltered spot, and there changes to a dark brown chrysalis, from which in due time the moth appears.

The perfect insect measures, when its wings are expanded, about an inch and three-quarters across (see fig. 6). Its wings are

gray, varied with dark brown dots and spots and shadings. Near the hinder angle of the front wings is a rather conspicuous spot not very distinctly shown in the figure, resembling the Greek letter *psi* placed sidewise. There are two broods of this insect during the year; the moths of the first appear in June, deposit eggs which produce larvæ that reach their full growth, pass through the chrysalis stage, and from which moths emerge about the end of July. The second brood of larvæ are found about the last of August and throughout September; they become chrysalids late in the season, and pass the winter in the chrysalis state.

Fig. 6, after Riley.

The Lime-Tree Measuring Worm *(Hybernia tiliaria)*, Har.

The larva of this insect is a yellowish looper or measuring worm, with a reddish head and ten wavy black lines along the back. It is shown in fig. 7 in different positions.

Fig. 7, after Comstock.

It is hatched early in the spring, and completes its growth about the middle of June, about which time it is often very destructive to basswood, elm, hickory and apple trees. When ready for its next change the larva lets itself down from the tree by a silken thread and buries itself five or six inches below the surface of the ground, and there changes to a chrysalis from which the moth usually escapes the following spring. Occasionally some of the moths appear in October or November, but this rarely occurs with us.

The male moths have large and delicate wings and feathered antennæ, as seen in the figure. The fore wings, which measure when spread about an inch and a-half across, are of a rusty buff colour, sprinkled with brownish dots, with two transverse wavy brown lines and a central brown dot. The hind wings are pale with a brown dot about their middle.

The female, also shown in the figure, is a wingless, spider-like creature, with slender, thread-like antennæ, yellowish white body, sprinkled on the sides with black dots, and

with two black spots on the top of each segment excepting the last which has only one. The eggs are oval, of a pale colour, and covered with a net-work of raised lines.

THE GRAPE BERRY MOTH—*(Eudemis botrana.)*

This insect is an imported species and has long been injurious to grape culture in the south of Europe. The exact period of its introduction to America is not known, and it is only within the past few years that attention has been called to its ravages. When abundant it is very destructive, in some instances it is said to have destroyed nearly fifty per cent. of the crop.

During the past season it has been very abundant in the neighbourhood of London, there being very few vines the fruit of which has not been more or less injured. The young larvæ have usually been first observed early in July, when the infested grapes show a discoloured spot where the worm has entered. [See fig. 8, *c.*] When the grape is opened and the contents carefully examined there will usually be found in the pulp a small larva rather long and thin, and of a whitish green colour. Besides feeding on the pulp it sometimes eats portions of the seeds, and if the contents of a single berry are not sufficient, two, three, or more are drawn together as shown in the figure and fastened with a patch of silk mixed with castings, when the larva travels from one to the other, eating into them and devouring their juicy contents. At this period its length is about an eighth of an inch or more; the head is black and the next segment has a blackish shield covering most of its upper portion; the body is dull whitish or yellowish green. As it approaches maturity it becomes darker in colour, and when about one-third of an inch long is full grown, see *b*, figure 8. The body is then dull green with a reddish tinge and a few short hairs, head yellowish green, shield on next segment dark brown, feet blackish, pro-legs green.

Fig. 8.

When the larva is full grown it is said to form its cocoon on the leaves of the vine, cutting out for this purpose an oval flap, which is turned back on the leaf forming a snug enclosure which it lines with silk; frequently it contents itself with rolling over a piece of the edge of the leaf, and within such retreats the change to a chrysalis takes place. The chrysalis is about one-fifth of an inch long and of a yellowish or yellowish brown colour, from which the moth finally escapes.

The perfect insect, which is shown magnified, at *a*, figure 8, measures when its wings are spread nearly four-tenths of an inch across. The fore-wings are of a pale, dull, bluish shade with a slight metallic lustre, becoming lighter on the interior and posterior portion, and ornamented with dark brown bands and spots. The hind wings are dull brown, deeper in colour towards the margin, body greenish brown.

There are two broods of this insect during the year. The spring brood has been found by Miss Mary E. Murtfeldt, of Kirkwood, Missouri, feeding on the tender shoots of the common ironweed, *Vernonia noveboracensis*, which they web together for their better protection. When mature the larvæ cut small flaps from the larger leaves, fold them over and fasten them at the edges, within these enclosures the larva changes to a pupa. Professor Fernald, of Orono, Maine, has found the spring brood of this larva similarly affecting the Tulip tree, *Liriodendron tulipifera.*

REMEDIES.

As it is probable that most of the late brood pass the winter in the chrysalis state attached to leaves, if these were gathered and burned a large number of the insects would perish. The infested grapes might also be gathered and destroyed. This insect is attacked by a small parasite which doubtless does its part towards keeping the enemy in subjection.

ON THE MOUTH OF THE LARVA OF CHRYSOPA.

(Read before the A. A. A. S., at Montreal.)

By William Saunders, London, Ont.

Recently I had the opportunity of watching in a live box, under a low power of the microscope, the seizing and devouring of some plant-lice by a larva of an undetermined species of Chrysopa, and was interested in the manner in which it emptied the body of its victims. The jaws are large, hooked, pointed, and tubular; with a small opening at or near the points. Approaching its prey the body of the Aphis is grasped by the hooked mandibles which at the same time pierce it. The Chrysopa larva remains stationary, and proceeds to pump its victim dry. At the base of each of the mandibles the integuments are dilated into a sac-like form, capable of expansion and compression at will, a portion of the thorax is similarly constructed, and it is by the repeated dilating and compressing of these sacs that the fluid contents of the body of the Aphis are transferred through the tubular mandibles to the stomach of the Chrysopa larva.

When the abdomen of the Aphis has been emptied, the points of the mandibles of the Chrysopa larva are thrust into the thorax, and forward into the head in every direction, and in a few moments nothing remains of the once plump plant louse but a shrivelled skin. In the authors accessible to me, I can find no reference to these elastic bulb-like sacs at the base of the mandibles, nor to the peculiar structure of the thorax, which admits of its expansion and contraction as referred to.

"MOSS-HUNTING."

By Professor J. T. Bell, Belleville, Ont.

Having had several enquires addressed to me as to how I captured the Pselaphidæ, etc., a list of which appeared in the *Entomologist* of March, 1881, it has occurred to me that it might be acceptable to some of my entomological brethren to have a detailed account of my method of moss-hunting published in our organ.

First, then, as to gathering the moss. For pedestrian excursions, a gamebag or haversack to sling over the shoulder, will be most convenient; where a vehicle is employed, a pillow case or grainbag may be used, and in either case a small hand rake about a foot long will be found very useful. As soon as the snow leaves the ground, the collector may seek some open swampy woods, where the ground is varied with little mounds by the decay of fallen trees or the upturned roots of windfalls, which are overgrown with mixed mosses,—or the banks of a pond or creek strewn with rotting logs and branches. The moss should be taken up in large flakes, with as little disturbance as possible, and packed tightly in the bag. It is of little use taking the moss which grows in thin sheets on the stumps and trunks of trees, as few insects will be found in it; and there is one sort which grows in compact oval bunches of a bright green, which I uniformly reject as barren. The most productive is that which grows on the ground, and is not less than an inch in length of stem. So long as the ground is clean of snow, a little frost is not objectionable, but rather the reverse, as some of my most successful collecting was done when the moss was pretty well frozen, and the pools were covered with ice strong enough to walk over; but, whatever may be the weather, the moss must be damp,—insects will not live in dry moss.

Having brought a cargo home, the next step is to get out its living treasures, for which the following implements will be needed: 1. A sieve, which can be easily and cheaply made as follows: A light wooden box about nine inches by seven inches may be had at any drug store: the bottom is knocked off and replaced with a piece of wire-web of four meshes to the linear inch; the sides must be cut down with a fine saw to a depth of three inches, and strips about half-an-inch wide nailed along the sides beneath the wire to keep it from touching the table. 2. A sable or camel hair pencil of the size known as

duck quill, on a wooden handle. 3. A pair of flexible tweezers with fine points. 4. A small palette knife, the use of which is when a small insect is covered up among the dust and debris of the moss, to take up a portion and scatter it on a bare place on the paper, when the beetle will become accessible. 5. A hand or pocket magnifier. 6. Two cyanide bottles, without sawdust. 7. A basket or box to receive the spent moss.

The operator will place the sieve upon a sheet of strong white paper,—cartridge paper is best—and taking up a moderate handful of moss, tease and shake it well over the wire; he will then lift the sieve, giving a couple of smart taps on the end to dislodge any clinging insect—and look out for the "bugs." The Carabidæ and Staphylinidæ will first run at racing pace over the paper; the Pselaphidæ and Scydmænidæ will progress more deliberately, though still pretty rapidly, in a steady, straightforward march, with their prominent antennæ stretched out before them, while the Trichopterygidæ will circle about, like the Gyrini upon the surface of a still pool, at an astonishing pace for such molecules of beetles. The larger insects may be captured with the fingers or forceps; the smaller ones by moistening the brush between the lips and touching them with the point, to which they will adhere; the brush with the insect attached is introduced through the neck of the bottle, when a slight fillip with the fingers will dislodge the captive. In the meantime the Curculios, Chrysomelas, Tenebrios, etc., will recover from the shock, and betray their presence in their own slow, deliberate manner, when they too can be secured. Along with the beetles there will be seen numerous spiders, ants, mites, poduras, etc., and now and then a few small Diptera and Hymenoptera.

To display the smaller captured beetles to the best advantage, they should be suffered to remain for twenty-four hours in the bottle, when the cyanogen vapour will have caused their limbs to be limber and relaxed. They may then be attached to a strip of cardboard by a small portion of mucilage, previously thickened by evaporation till it will not spread out or sink into the card. A sufficient number of spots of this are placed about a quarter of an inch apart, and on each spot is laid a beetle, back down, care being taken that the head, legs, and antennæ are kept from contact with the cement. When the latter has hardened sufficiently to hold the insect in its place, its antennæ, palpi, legs, etc., may be adjusted with a very small, short-haired, red sable pencil, just moistened enough to make the hairs adhere together and form a single point. For the larger and more refractory ones, a fine sewing needle, set in a wooden handle, and bent at an obtuse angle at the point, may be used.

When the limbs have been properly adjusted, the insects may be laid away to dry, which will require three or four days for the smaller, and twice that time for the larger ones. When dry they may be removed from the card by inserting the point of a fine needle under the shoulder; if this is carefully done the insect will generally come clear off without damage to the most delicate pubescence or the longest bristles. Any portions of the mucilage which may adhere to the elytra, may be removed with the needle point or sable pencil moistened as before. Each specimen may then be mounted on a strip of cardboard, or fastened to the cell of a microscope slide with a minute touch of Canada balsam, and a thin glass cover cemented over it, when it will form an interesting object for examination either by direct or transmitted light.

ALYPIA OCTOMACULATA.

By H. H. Lyman, Montreal, P.Q.

Last June I was in Boston, from the 14th to the 30th, and during this time *Alypia octomaculata* was in season and very abundant. Had I chosen to carry a net in the public gardens and uptown streets, I suppose I could have taken a couple of hundred specimens, always provided that I wasn't "run in" as a lunatic. As it was, I contented myself with carrying a supply of pill boxes, and succeeded in taking about thirty-five specimens. During two days I was visiting a friend about seven miles from the city, but did not see a single specimen of this species; but in those streets in which there were

small plots of grass in front of the houses, they were very common. The spot where I took most of those I captured was a plot of grass about ten feet by seven, in which there was a Syringa between two Deutzias, both species of shrubs being in blossom. The *Alypias* constantly frequented the latter, and were there easily taken with a pill box, but though they occasionally alighted on the leaves of the Syringa, I never saw them visit the flowers.

INSECTS INJURIOUS TO DRUGS.

By William Edwin Saunders, Ph. G., London, Ont.

In this paper is given simply what has been noted by the writer during a study of these insects extending over more than a year.

Sivodrepa panicea.—This is the elliptical, reddish brown beetle, about one-eighth of an inch long, which is found in almost every edible drug, and in some, such as aconite root and capsicum, that would be pronounced far from edible. In addition to these two drugs, I have found it in bitter almonds, sweet almonds, angelica, boneset, calumba, chamomile, chocolate, coriander, dandelion, elm bark, ergot, extract of licorice, German chamomile, orris root, prince's pine, rhubarb, squill, and sweet flag.

The larva is white, with a brown head, is about twice as long as the beetle when full grown, although it is seldom or never seen stretched out at full length, always remaining curled up in a ball. It will in time fairly honeycomb a piece of root with small holes about one-twenty-fifth of an inch in diameter, at the end of which it is generally to be seen at home. Under the influence of camphor, these larvæ become uneasy, but being apparently unable to crawl away, resign themselves to their fate, and seem to thrive just as well with camphor as without it.

Calandra remotopunctata.—This is a small, black beetle, about the size of the last, with what is popularly termed a "snout," projecting from the front of the head downwards. Under the microscope the back, thorax, and head are seen to be finely pitted, giving the insect a rough appearance. It was found in large numbers, the larva feeding on pearl barley, inside of which it lives, the egg being probably laid in the grain by the parent, and on hatching, the little insect makes its home there, eating all but the shell, and sometimes attacking the grain from the outside.

Tenebrioides mauritanica, a species of "meal-worm," was found in pearl barley, and one specimen in calumba. It is a dark brown beetle, five-sixteenths of an inch long, the head and thorax forming nearly half the total length, and the mouth being fringed with hair. The back, which at first sight appears perfectly smooth, proves to be, when examined under the microscope, longitudinally corrugated. The larva is nearly half an inch long, white, with a brown head, and between the jaws is a row of hair as in the perfect insect. The posterior end is furnished with a pair of claspers.

Trebolium ferrugineum is a flat, reddish brown beetle, about one-eighth of an inch long, appearing smooth to the naked eye, though the microscope shows the back numerously pitted. These insects affect patent foods and similar substances, and the beetles are possessed of remarkable longevity, as proved by the fact that I have kept a few alive for two months in a small box with a little ceralina, which seems to be their favourite food. Whether the beetles themselves eat it or not I do not know, but they certainly have a liking for the dead bodies of other beetles.

Silvanus surinamensis is a narrow, brown beetle, almost one-eighth of an inch long, with a pitted and longitudinally corrugated back. One specimen only was found, on anthemis.

Anthrenus varius.—This insect has been found only in cantharides, but I believe, also attacks other animal drugs, such as castoreum. During the month of July there emerges from the egg a very active larva, densely covered on the tops of the segments with stiff brown hairs, which, at the posterior end, point towards the centre of the back forming a ridge, and when the insect is annoyed, it has the power of dividing the ridge in the centre and throwing it down on each side in a fan-like position, the object of which

movement could not be determined. When the insect has been feeding on the whole cantharides, all these hairs on the back become rubbed off, those forming the ridge being generally last to go, because, being on the dowuward slope of the body, they are not exposed to the same amount of friction. Underneath, however, the hairs are shorter, and do not become rubbed off as on the back.

The larva consists of eleven segments, those at the ends being of a much deeper brown than those towards the middle, and the six legs being inserted on the three anterior segments, each furnished with a short, straight claw. The skins are shed quite often during the larval state, and are discarded by a slit nearly the length of the back, terminating indifferently at either end, and through which the insect emerges. The shed skins present a beautiful iridescent appearance under the microscope when viewed by reflected light.

These larvæ feed on the cantharides all winter, and if in quantity, commit great havoc, leaving only the hard exterior portions untouched, such as the upper portion of the thorax, the green wing cases, and transparent wings. When their legitimate food gives out they have no compunction about first eating their dead parents, and then each other, but on this diet they do not seem to thrive so well.

The beetle emerges in May or June, and is about one-eighth of an inch long, oval and black, the upper parts being marbled and streaked with whitish and rufous, which are rubbed off after death if the insect is subjected to any rough usage.

Camphor does not kill these larvæ, and after keeping some for a day in a small box about a quarter full of camphor, the only thing worthy of remark in their actions was that they did not seem quite so lively as those kept without it. Camphor is not a *remedy* but merely a preventive measure. The vapor of chloroform rapidly kills them, so that by putting a small quantity of chloroform in a gallipot on the top of the infested cantharides, the heavy vapor will sink through it and destroy them.

INSECTS AFFECTING DRUGS.

By E. A. Schwarz, Washington, D. C.

To the list of drug insects observed in this country, as given by Mr. Wm. Edwin Saunders, I have two additions to make. One is the Tobacco-beetle, *Lasioderma serricorne* Fabr., a well-known pest in many cigar factories in the United States. I found this in a drug store at Detriot, Mich., where the larvæ had completely honeycombed a lot of rhubarb. The same hadit of the species has been recorded by European writers. The second addition is *Cryphalus jalappæ* Letzner, a small, inconspicuous Scolytid beetle, probably originating from Mexico, which has been carried by commerce all over the world. It was first found by Mr. H. G. Hubbard and myself in 1874, in the Medical Laboratory of the United States Navy Yard at Brooklyn, N. Y., and later observed by myself in drug stores at Detroit, Mich., and Washington, D. C. It occurs only in *Radix jalappæ*. The species has to my knowledge never before been recorded from North America, but will no doubt be found wherever the drug mentioned above is kept.

DESCRIPTION OF A DIPTEROUS PARASITE OF PHYLLOXERA VASTATRIX.

Diplosis? Grassator, n. s.

By Rev. T. W. Fyles, Cowansville, P.Q.

Larva, one-tenth of an inch in length—pointed at the head—rounded and blunt at the hinder extremity. First three segments the colour of amber, and semi-transparent: the rest of the body salmon coloured. Nine sets of hooks, or tentacles, in place of feet, the

two first in pairs, the remainder in threes. The larva has the habit of holding itself erect, by means of peculiar anal protuberances which seem to cling by suction. The body has minute hairs thinly scattered over it. On the sides of the head, which is small and black, there are bristle-like palpi, pointing forwards. The larva is full fed by the end of August.

Fig. 9.

In the accompanying figure, drawn by myself from nature, the larva is shown at *a*, the pupa at *b*, and the imago at *c*, all highly magnified. The natural size of the perfect insect is given at *d*.

Pupa, dark brown, about 9-100 of an inch long. The antennæ cases form a striking feature, projecting on either side about one-sixth the length of the pupa, and giving a flattened appearance to the head. A pair of setæ mark the position of each spiracle, and there is a rounded protuberance at the hinder extremity.

Imago.—Wings, semi-transparent—beautifully opaline—three-ribbed—having the form of the blades of a propeller—fringed with long hairs. Balancers conspicuous. Antennæ, setaceous, 24-jointed, having a circlet of hairs around each joint. Eyes, large and black. Thorax, reddish brown, with a peculiar hump on the back, behind the wings. Legs, long and hairy. Abdomen, salmon coloured—has two lines of hairs extending lengthwise on the under side. The perfect insect appears early in September.

[This insect was reared by us about the same time as those by Mr. Fyles. It was very common in the neighbourhood of London this year, infesting the gall-inhabiting type of the Phylloxera. The following notes in reference to it may be of interest, omitting the description already so well given by Mr. Fyles: "About the middle of August my attention was directed to the foliage of some grape-vines, Clinton and other varieties, which were suffering from an attack of the gall-inhabiting type of Phylloxera. On opening some of the older galls they were found to be free from living lice and occupied by one, or in some instances two, small, brown chrysalids, and a number of the empty skins of the young lice. On further examination many of the galls were found to contain the larvæ of this same insect. The egg is deposited by the parent fly in the gall, or at its entrance. Each gall is usually occupied by several full grown lice, and from 50 to 500 minute yellow eggs, which are gradually deposited and as gradually hatched. The young larva of our new found friend is very active, and groping about within the hollow of the gall, seizes on the young lice as hatched and sucks them dry. We could find no evidence of its attacking the parent lice, as long as the newly-born and tender progeny were in sufficient abundance to furnish it with a constant supply of fresh food. In some instances one larva, in others two were found in a single gall; but in no instance have we found living lice with the chrysalids, an evidence that this insect does its work thoroughly. A sufficient number of galls have not yet been examined to determine with any accuracy the proportion occupied, but they appear to be sufficiently numerous to materially check the increase of this destructive pest."—Ed. C. E.]

COLLECTING IN EARLY WINTER.

By James Fletcher, Ottawa, Ont.

Nov. 13, 1882.

The unusually mild and balmy weather that we have been enjoying for the last week has made it an easy task for the entomologist to neglect his cabinet and correspondence, even now, in the very heart of the exchanging season, and go out into the woods in

search of treasures. Thus many a luckless *Vanessa* or *Grapta*, beguiled by the warm, seductive sun from her winter quarters, to have a last ærial promenade before her long cold nap, has found her way into our collections. The morning of Thanksgiving Day here (9th Nov.) seemed to outdo all its fellows in its efforts to charm grumbling mankind, and seemed to insist on everyone being thankful and happy. To the lover of flowers the woods provided several autumn blossoms of such flowers as *Viola blanda* and *V. Canadensis*, late blooms of Solidagos, *Achillœa millefolium*, and stunted Asters whose heads had been broken or eaten off by cattle, but who were yet determined to have their look at the world. Among the damp trees the gauzy-winged male moth of the canker worm could frequently be seen hurriedly flying from tree to tree in search of his wingless wife. On the walls of a house several specimens of the curious little hammer-headed Fly, *Sphyracephala brevicornis*, were taken. A fine specimen of *Vanessa milberti*, which came to peer at me by settling within a couple of feet of my head, reminded me of the following, which formerly appeared in the "Dublin Penny Journal," and which, as such literature is not at all common, I thought might be entertaining to some of the readers of the *Entomologist :*

"At the last meeting of the Entomological Society, Feb. 5th, 1844, a beautiful specimen of *Pontia rapæ*, evidently just disclosed from the chrysalis, was exhibited by F. Bond, Esq., which he had captured during the preceding month."

"Child of the Summer, what doest thou here,
In the sorrow and gloom of the weeping year?
When the roses have withered that bloomed on thy birth,
And the sunbeam that nursed thee has passed from the earth;
The flowers that fed thee are frozen and gone—
Thy kindred are perished, and thou art alone—
No one to welcome—no one to cheer—
Child of the Summer, what doest thou here?
Yet 'tis sweet thy gossamer wing to view,
Revelling wild in the troubled blue—
Heeding nor rain, nor snow, nor storm—
Buffeting all with thy tiny form.
Even thus the hope of our summer days,
In the heart's lone winter gaily plays—
Thou art the type of that hope so dear—
Child of the Summer! thou 'rt welcome here!

Welcome 'mid sorrow, and gloom, and showers,
Emblem of gladness that once was ours—
Emblem of gladness that yet will come,
When the sun-bright ether will be thy home;
And myriads of others as bright as thou,
Will revel around us—all absent now:
Emblem of hope to the mourner dear,
Child of Summer! thou 'rt welcome here!"

HYBERNATING BUTTERFLIES.

By A. R. Grote, New Brighton, N. Y.

I am sure your readers were pleased at your printing the pretty lines on a winter butterfly, which Mr. Fletcher took the trouble to send. I remember very many years ago, in January, finding a hibernating *Vanessa Antiopa* in the garret of our Staten Island farm house. It hung from a rafter and seemed almost dead. I placed it on a brick flue, which was hardly warm, but it did not revive at the time. Some few days after, the

weather having become milder, I searched for it and found it where I had laid it, still on its side with the legs drawn in. But on touching it, the wings suddenly unclosed, the insect took to flight, and, the window being open, it escaped into the winter sunshine. Some years after I found three or four specimens of *Pyrameis Atalanta* under the same circumstances, all close together, hanging to a rough rafter and perfectly torpid. On being placed in a warm room they revived in a short time and I allowed them to escape. As early as warm February days I have met the Camberwell Beauty and Admiral, in solitary state, on the wing. The south side of Staten Island soon gets warmed by the spring sun, and is a good collecting field for the entomologist.

THE WHITE MARKED TUSSOCK MOTH, *(Orgyia Leucostigma)*. Smith.

By Frederick Clarkson, New York City.

The foliage of the trees in this city is undergoing spoliation by the larvæ of this moth. Many of the trees are entirely denuded of their leaves, particularly the silver-leaf poplar, the ailanthus alone escaping attack. The writer suggested to the authorities last spring that hand-picking of such cocoons as contained the deposit of ova was the only sure way of exterminating these insects. Had such service been rendered the trees at that time, this damaging visitation would have been prevented. There is good reason to believe, however, that what the authorities have failed to do, a young army of parasites, "Pimpla," which have put in an appearance during the last fortnight, are now actively attempting, and we shall probably be rid of this moth another year. The ova commenced to hatch out about the 25th of May, and the larvæ began to assume the pupa form about the 21st of June; ten days thereafter the imago was discovered depositing ova. Out of twelve cocoons gathered on the 15th of July, four yielded the parasite already referred to. I would note here in connection with this parasite a circumstance very commonly observed among the lepidoptera. I discovered two ♂ parasites upon a cocoon containing the pupa of this moth. I drove them away several times, but they as frequently returned. I finally captured them, and placed them together with the cocoon in my collecting bottle. Before I had returned to my residence a ♀ Pimpla had emerged from the cocoon and was busily employed in expanding her wings. I also noticed that this parasite deposits its ova through the cocoon on to the pupa, and that in every case that came under my observation the pupa selected was the ♀, doubtless from the fact that its plump condition provides the necessary food for the development of the parasite, which the ♂ pupa of the moth could not furnish.

ENTOMOLOGICAL NOTES FOR 1882.

By Prof. E. W. Claypole, New Bloomfield, Pa.

My removal from Yellow Springs, Ohio, to New Bloomfield, Pennsylvania, has had the effect of breaking off the line of my entomological work, or at least throwing it into a rather different channel. Among the first results is a notice of the striking difference between the two places in regard to insect depredations. In my experience last year a great part of the time was occupied with fighting insects. The cherry weevil, the potato worm and beetle, and the apple worm were the ringleaders; but after them came the blister beetles, the turnip flea, the corn worm, the squash bug, *et multa alea*. Here, at least during the present, or rather past season, the ravages of all these have been quite insignificant. Foremost stands the potato beetle. As soon as the young plants came up I followed my usual plan of picking them off and dropping them into a tin having a few spoonfuls of coal oil at the bottom. By this means they cause no trouble in crawling out again. Though the season was rainy, and therefore the opposite of the last, yet I

found two applications of the poison dust (one part of London purple and sixty parts of wood ashes) quite sufficient to keep the plants free from the young grubs. I am inclined, however, to recommend the use of plaster instead of ashes in a wet season. It seems to adhere better to the leaves when rain falls on them.

To my surprise there was here no second brood of the beetles this year. A few belated individuals appeared, but nothing that deserved the name of a brood. Of course the earliest potatoes were ripe before the usual second emergence, but the late ones grew and were green almost till frost came, but were perfectly uninjured after the beginning of July. I cannot learn if this is usual, for I can find no one who has been sufficiently observant, or who is sufficiently acquainted with the habits of insects in general, and with those of *Doryphora 10-lineata* in particular, to tell me. They come, they are here, they go, but when, why and how they come and go is a matter which no one here seems to have considered. Another year I shall try and make more general observations on this point.

Not only is the potato beetle less mischievous here than it was in Ohio, but all the others named follow suit. The apples are much less infested with worms; blister beetles I have scarcely noticed; corn worms are quite innocuous, and as for the cherry weevil, though the crop this year was not heavy for all kinds of cherries, and the fruit should, therefore, be at its worst, I have not seen a score of them all through the summer. I noticed one or two on my own trees showing the crescent cut, but no more. It was almost as safe to eat the fruit unexamined, as it is in England.

By the way, I never hear any apprehension expressed concerning the migration of *Conotrachelus nenuphar* across the Atlantic. Though fruit is less abundant there than here, yet the introduction of the pest would be a very serious drawback to the enjoyment of plums, peaches, and cherries, not to mention the loss caused by its attacks on the apple.

On the other hand, if these insects are less injurious in Pennsylvania than in Ohio, the imported currant worm is more so, and the growth of currants is greatly limited by its ravages. Very few persons seem to know what can be done by the use of poison to rescue the bushes and the currants. Great, but totally unfounded prejudice also exists against the use of poison, even on potatoes; many people seeming to fear lest the potato should absorb sufficient arsenic as to render its use as a table vegetable dangerous. It is needless to say that all such ground of alarm has long been set at rest in the minds of those who have followed the progress of economic entomology. But prejudice is blind to reason and slow to die away.

In addition to this the various web-worms on the forest trees are vastly more numerous here than they were at Yellow Springs. In earliest spring and before the leaves are generally out, the American Lackey Moth *(C. Americana)* takes possession of the cherry trees and covers the young foliage with its net. Soon afterwards the Forest Lackey *(C. sylvatica)* follows on the same tree, but more frequently on the apple, and later still the walnuts are attacked by the fall web worm *(H. textor)*, whose nests remaining on the trees after the fall of the leaf, disfigure them through the winter.

This year, also, the oak caterpillar *(D. Senatoria)* has wrought great ravages in the forest. I have seen hillsides that looked as if fire had passed over them in consequence of the destruction of the foliage by millions of this species. In the woods they could be found crawling over almost every square foot of ground, and lying dead by dozens in every pool of water. The sound of their falling frass, too, was like a slight shower of rain. Farmers tell me they have never known them so abundant before within their recollection. Harris says this species live on the white and red oaks *(Q. alba and rubra)* in Massachusetts. Here the white oaks were untouched, and the red oak is not abundant. The food of the caterpillars was almost exclusively the foliage of the black oak *(Q. tinctoria)*, the scarlet oak *(Q. coccinea)*, and the bear or scrub oak *(Q. ilicifolia)*.

EXPERIENCE WITH INSECT POWDERS.

I have used the Pyrethrum powder, "Buhach" mixed with ten parts of flour, as the easiest and most effectual remedy for the cabbage worm. It was mixed in 1881 and

remained mixed in the "insufflator" till the past summer without apparently losing any of its virtue. Its effect was in nowise diminished. I gave some of the mixture to a friend here whose sheep were infested with ticks, requesting him to try it and report to me. He did so, saying that the ticks seemed to enjoy it and he rolled them about in it without inconvenience or injury so far as he could see.

I have both kinds *Pyrethrum roseum and P. cinerariifolium* growing from seed sent me by Prof. Riley.

There are marked distinctions between the plants from the very first. The seed leaves of *P. roseum* are spatulate, those of *P. cinerariifolium* are oval. The former throws out a single leaf from between them; the latter throws out two together. The foliage of the former has a tendency to lie flat on the ground, and looks comparatively feeble; that of the latter is ranker and stands much more upright. The plants now (January 1st) look healthy and strong. *P. roseum* lived out of doors in Ohio through last winter, without the slightest care or protection, in a box above ground. Some of the plants began to grow in February, but a heavy rain, followed immediately by a hard frost, unfortunately killed their roots late in the spring. Had they been in the ground this accident would hardly have happened. So far as I can see *P. cinerariifolium* is the more hardy of the two. I will report later on my success, if I have any during the coming season of 1883.

INSECTS COLLECTED IN 1882.

By W. Hague Harrington, Ottawa, Ont.

30th March, 1883.

Although the snow still heavily shrouds the earth, and the air is frosty, the stern, cold sway of winter must soon be ended, and naturalists will again go forth into the fields and forests. Before entering, however, on the coming campaign, I would like to record for my fellow collectors a few facts culled from my copious notes of the past year. The spring of 1882 was very backward, so that insects were unusually scarce during April and May. On the other hand, the autumn was prolonged and fine, and many species could be collected up to the end of October. On April 25th, I carefully searched the pines for Buprestidæ (which at the same date in 1881 were abundant), but could not find a single specimen. On May 11th, a second investigation resulted in the finding of only two specimens of *Chalcophora liberta*, Germ. On June 6th, this species was abundant, and several specimens of *C. virginiensis*, Dr., and *Chrysobothris Harrisii*, Hentz, were also taken. *C. virginiensis*, Dr., *C. liberta*, Germ., and *C. fortis*, Lec., were taken again on several days between September 24th and October 16th. On April 30th, Tiger Beetles were making their appearance, and some specimens of *C. vulgaris*, Say, were taken just emerging from their winter quarters in the sand, under stones and chips. *C. sex-guttata*, Fab., as is well known, frequents paths and clearings in woods. On wet or dull days it may often be found sheltered under the loose bark of fallen trees, or in the deserted burrows of borers, down which it retreats when disturbed. While stripping the bark from a large prostrate maple on May 22nd, to obtain larvæ, I captured three of these beautiful beetles, which had thus been driven to shelter by a shower. The tree yielded numerous specimens of *Eupsalis minuta*, Drury, and some pupæ of *Saperda tridentata*, Oliv., from which imagos emerged on June 15th. On June 16th, while beating the branches of a butternut, I found upon my net a Curculio (blackish with an oblique white dash on each elytron), which was new to me, but could find no more upon the tree. As I was leaving the field in which it stood to enter an adjoining wood, I saw upon the gatepost a similar weevil, and a glance around showed me a large butternut growing but a short distance away and having a large dead limb resting on the fence. I at once concluded that the weevils had come from this, and, on examining the decaying limb, hundreds of the beetles were found upon it. On

a length of only five or six feet I took fifty, nearly all of which were paired. The beetle proves to be *Pseudomus truncatus*, Lec. On the 21st I took two specimens of *Cephaloon lepturoides*, Newm., as well as several of *Dendroides concolor*, Newm., and other fine species. Among the beetles mentioned by Dr. Le Conte as bred from hickory twigs, is *Chariessa pilosa*, Forst. During the latter part of June and the following month numerous specimens of this handsome beetle were observed upon felled and old hickories. They were very active —coursing about in search of prey, and doubtless destroying many insect enemies of this tree. One was seen devouring an *Agrilus egenus*, Gory, and a second feasting on *Magdalis barbita*, Say, both injurious and abundant species. The delicate and rare Buprestis, *Pœcilonoto cyanipes*, Say, was captured on June 22nd, upon a dead willow, which I hope may yield me more during the coming season. On the same day a very fine female *Bellamira scalaris*, Say, was taken ovipositing on an old maple stump. Beating low bushes on the margins of a small lake yielded numerous species, including *Cupes concolor*, Westw., the only specimen of this family I have yet taken. During September the Locust-borer, *Cyllene robiniæ*, Forst., was very abundant in all parts of the city. Although I had never previously captured the beetle, I knew from the decayed condition of our locust trees (which are not numerous), that it must infest them. In the latter part of the month, *Œcanthus niveus*, was, as is usual, in large numbers on raspberries, and in full song, if we can so designate its musical performance. An interesting feature of its concerts is one of which I have not been able to find any mention in books accessible. While the male is energetically shuffling together its wings, raised almost vertically, the female may be seen standing just behind it, and with her head applied to the base of the wings, evidently eager to get the full benefit of every note produced. On October 7th, I discovered in the seeds of the basswood some lepidopterous larvæ of which I would be glad to hear from members studying lepidoptera, as I can find no mention of any moth attacking the fruit of this tree. Do the larvæ leave the seeds, and, as they have the power to do, lower themselves to the ground, or do they remain until the seeds fall from the tree? The seeds are completely eaten out, and I noticed in a double-seeded fruit that after finishing one seed, the larva proceeded to the other.

AN UNUSUAL MODE OF COLLECTING INSECTS.

An office-mate made a capture last summer in a novel manner, but such as would not meet with the favour of entomologists as a method of collecting. He had occasion one hot midsummer day (29th June) to go out for a short time, and on returning complained that a fly had flown into his ear, and, having crawled in as far as possible, was causing great annoyance by a disagreeable buzzing and scratching. I advise him to pour a few drops of oil into the infested organ, or, better still, perhaps, to seek a doctor and have the occupant extracted by skilled labour. On reaching the doctor's office he found that he was absent at a medical convention, but after telephoning all over the city he found a stay-at-home doctor to whom he went and stated the case. An examination of the ear was made, but the doctor could discover nothing in it, and as the buzzing and scraping had then ceased, it was decided that the insect had taken his departure. However, he said it would do no harm to pour a little oil into the ear to allay the irritation which the fly had caused. My friend had not gone far from the office when the insect, which had only been taking a rest of "playing possum," commenced a more violent commotion than ever, causing his unwilling host to hurry home and try the anointing process. Hastily pouring in a few drops of oil, he lay down with his ear on a pillow, and almost immediately felt the intruder withdrawing from its hiding-place and beating a retreat. Lifting his head he was astonished to see, not a *fly*, as he expected, but a long-legged, active *beetle*, scampering away. This he imprisoned and bore back triumphantly to me to identify. It proved to be a full-sized and lively specimen of *Acmœops pratensis*. The doctor, on being afterward confronted with the prisoner, was greatly surprised that it had so well secreted itself from him, and assured my friend that it might easily have caused serious trouble. Small insects cause frequent annoyance and occasional slight pain by flying into

eyes and ears, but it is fortunate that such formidable hard-shelled beetles as the species just mentioned do not make a habit of exploring our ears. Had the case been that of some "blockhead," one might have supposed that the beetle had visited him under the guidance of instinct, but in the present instance the intrusion must have been merely the result of accident.

Much as beetles injure man's property, they seldom attack his body, but there is one Canadian species which most decidedly indulges in that unpleasant habit, and to an extent that is perhaps unknown to many entomologists. I refer to *Melanophila longipes*, which occur from 12th May to 12th Oct., and is usually abundant during the hot season, basking upon stone walls, etc. It has a fashion of lighting on one's collar and inflicting a sharp nip on the nape of the neck, and then disappearing with great swiftness. I have often been thus bitten, and have sometimes, by making a sudden grab, taken the beetle in the act and proved his identity. Last summer several instances of persons being bitten fell under my observation. While at dinner one day in a hotel, three or four sitting at the same table complained that some "confounded fly" had nipped them viciously. The gentleman sitting next to me was one of the victims and caught the offender, but it escaped almost immediately, only allowing him to see that it was black and harder than a fly. I was just going to say that it was probably a specimen of *M. longipes*, when I got a nip that settled the question and the insect.

A few weeks ago I was trying to convince two ladies that beetles might be handled fearlessly, as they had no biting propensities, when one of them at once exclaimed, "don't tell us that, for there is a nasty, little, flat, black beetle that bites me on the neck in the summer."

RARE BUTTERFLIES IN QUEBEC.

By John G. Jack, Chateauguay Basin, P. Q.

On the 16th of August last I captured in our orchard a beauitful female specimen of *Papilio cresphontes*, Cram., in perfect condition and evidently not long emerged from a chrysalis. Some days later (August 22) a specimen was seen and pursued without success, and on the 29th another very large female was taken. As one of the food plants of the larva, Prickly Ash (*Zanthoxylum americanum*, Will.) is abundant here, I think they must have bred in this locality, which is about fifteen miles south of Montreal. I think this is the first record of this butterfly being taken in the Province of Quebec. *Euptoieta claudia*, Cram., another butterfly rare in this latitude, was taken by me August 15th, 1874, near a hopfield, and is now in the collection of the Montreal Natural Historical Society. I mention this as Mr. Edwards gives Canada no credit for this species in his useful catalogue.

OBSERVATIONS ON LIMENITIS ARTHEMIS.

By Mrs. C. E. Heustis, Parrsboro', N. S.

I was much interested in an article in Vol. xiii., of the *Canadian Entomologist*, by Mr. W. H. Edwards, entitled, "Is *Limenitis arthemis* double-brooded?" My own observations previous to the time of reading the article were confirmatory of Mr. Edwards' theory; but I wished to learn more of this interesting species before hazarding any remarks concerning its habits.

I have never reared or attempted to rear *arthemis* from the egg, but have one specimen obtained from a full-fed larva found on the 2nd July, 1877. It went into chrysalis on the 3rd, and the imago appeared on the 16th. I have seen fresh looking specimens on 1st July, when enjoying, with other citizens, Dominion Day in the country. Later than this I have not seen a fresh specimen, excepting the example before recorded.

I find in an old note book the following entry: "Parrsboro', N. S., July 25, 1877, captured to-day a worn and battered specimen of *Limenitis arthemis*, the only example

seen, although the species is usually abundant in this wood." A few days later I saw another specimen less worn, but did not succeed in capturing it.

The bustle consequent upon a change of residence prevented me in the early part of last summer (1882) from doing much collecting, so that I had no opportunity to observe at how early a date *arthemis* appears here ; but later in the season I spent a few days with some friends in a collecting tour along the south shore of Cumberland Co., N. S., a distance of forty-five miles. We were in search of plants and minerals, as well as insects. We started on the 15th of August ; on that day I observed two examples of *arthemis*, one of which I took. It was sitting on a low shrub, and seemed to be perfectly stupid, making no attempt to escape when I put my hand on it. It was a good deal worn and damaged. On the three following days I observed quite a number, all in the same condition. At several points they were quite abundant, especially where our road lay through damp woods. Thus, so far as my observation extends, both in New Brunswick and Nova Scotia, *arthemis* may be taken occasionally, in good condition, as late as the middle of July, after which date I think few, if any, fresh specimens will be met with.

I have no doubt that worn and faded specimens might have been found in this county throughout August, or even in September last year. The extreme backwardness of the spring probably retarded the development of the larvæ, and thus caused the imagos to be seen later than usual.

DAMAGE CAUSED BY ANTS.

By E. Baynes Reed, London, Ont.

Early in the month of June I discovered that certain portions of the flooring and supports of my verandah were giving way, and I accordingly sent for a carpenter to do the necessary repairs. On taking up the flooring I found two nests of large black ants, and examination showed that nearly the whole damage was caused by these insects. Large joists were very much excavated, and in some cases eaten completely through ; two pillars or posts eight inches square were eaten out to a distance of some two feet from the floor, and unless prompt measures had been taken the corner of the verandah would in all probability have given way. I had noticed these ants for a couple of years back, but never dreamt that they were so numerous or were doing so much injury. I sent specimens to my friend, Dr. Hagen, and asked his opinion as to remedy. He writes me that the ant is *Formica ligniperda*, Latr. (*Camponotus ligniperdus*, Mayr). He recommends an application of boiling water in which soft soap has been largely dissolved.

LAST YEAR'S COLLECTING.

By J. Alston Moffat, Hamilton, Ont.

The connection between the weather and insect life is an interesting subject, but one that requires a vast amount of observation before any conclusions of much value can be reached. We are all familiar with the relation of the weather to the crops, but insects seem more dependent on favourable weather than vegetation is. The first part of a season may be very injurious to vegetation, whilst later on a favourable change may occur and it will recover all it lost and even exceed an average ; but with insects, if they have been seriously interfered with in the early part of their career the result is generally fatal to the bulk of them for that season. This is undoubtedly one of nature's methods for preventing excess. Ontario has a varied range of climate, and what thus is said of one section will not apply to others. Vennor considers Hamilton and neighbourhood endowed with a climate peculiarly its own, and the verdict of concurrent opinion is favourable. But whether it was the open winter or the long continued cold of spring, certain it is the summer of 1882 was rendered remarkable by the absence of butterflies ; even those least observant remarked it. *Pieris rapæ* appeared early, and then disappeared almost entirely

until quite late in the season. I did not see half-a-dozen *Archippus* the whole summer. The milk weeds stood in unbroken leaf until late in the fall, when they were taken possession of by extensive broods of *Euchates egle* larvæ. Even Skippers were scarce, and it was quite a treat to see a *Philodice*. On the 23rd of June I took for the first time here a *Terias lisa*, and there was not another yellow butterfly to be seen in the field. If *Philodice* had been plentiful I might not have noticed it. The Noctuids generally were scarce, and there was a noticeable absence of cut worms in both field and garden. There were but few species of *Catocala* abroad, and these not plentiful, except *Habilis*, which was so abundant as to be offensive. To our delight the highly attractive *Relicta* appeared in goodly numbers, which it was never known to do here before, and three dozen of them were secured. In fall moths a few good things were taken, but not in any quantity. In beetles, *Carabidæ* were scarce ; wood-borers were moderately plenty, but they were very late and straggling in appearing. Taking the season all through, it was not one of much success for collectors.

A NEW STATE ENTOMOLOGIST FOR ILLINOIS.

Prof. Cyrus Thomas, to whom we are indebted for six out of the eleven valuable reports which have been issued by the State of Illinois on noxious and beneficial insects, has removed to Washington, and Prof. S. A. Forbes, of Normal, Illinois, has been appointed State Entomologist in his place. We heartily congratulate Prof. Forbes on his well-deserved promotion, and also congratulate the authorities of the State in that they have secured the services of one so competent, thorough and painstaking as Prof. Forbes has shown himself to be in his published papers on natural science.

CIRCULAR OF INQUIRY CONCERNING CANKER-WORMS.

The U. S. Dept. of Agr. in November last issued the following circular :

In preparing a bulletin upon the subject of canker-worms, to be issued from this Department, I find that much of our present information is of little service, for the reason that until the year 1873 two entirely distinct species of Canker-worms were confounded in description, seasons, habits, and geographical distribution. In many of the publications, of late date even, the distinction is made either not at all or insufficiently.

The most widespread and best known species is the Spring Canker-worm (*Paleacrita vernata*, Peck). The female rises from the ground chiefly in spring, and secretes her ovoid and delicate eggs. The second species is *Anisopteryx pometaria*, Harris, and the female rises chiefly in the fall, and lays her eggs in serried and exposed masses.

Will you please give such information as you possess, especially upon the following points in regard to the occurrence of Canker-worms in your own locality :

1. Which species, if either, is now found in your own locality, or has ever been found ?
2. When was it first observed there ?
3. During what years has it been especially injurious ?
4. During what years has it been entirely unnoticed ?
5. Has the appearance of the perfect or parent insect been confined to either season, the fall or the spring, or has it covered both ?

Wherever any doubt can or does arise in regard to the species observed, it is particularly requested that specimens may be sent to the Department. All expenses for packing and postage will be reimbursed to the contributor, if a request to that effect is made ; or boxes and stamps for the return of specimens will be sent to any who will notify the Department of intention to contribute information and specimens.

Observations may be made during all mild weather from the present month (November) until the middle of June. The more frequent and detailed the observations the greater will be their value. If you have not the time or inclination to make these observations personally, you will confer a favour by handing this circular to some person who will be interested.

Should this circular come to the hands of any entomologist familiar with the two species, I would respectfully ask of such any information they may possess that will throw light on the range and preferred food-plants of either.

Respectfully,

C. V. Riley,
Entomologist.

A NEW FOE TO THE MAPLE.

By W. Hague Harrington, Ottawa.

On 25th June, 1882, I captured upon a maple shade tree near my house two insects belonging to the Hymenoptera, or insects with four membranous wings, such as bees and wasps. These I found upon examination to be female specimens of *Xiphydria albicornis*, described by Dr. Harris in his "Insects Injurious to Vegetation," as occurring "on the trunks of soft wood in August." The first, or generic, name is formed from a Greek word for a "small sword," to which the ovipositor of the female may be compared. The second, or specific, name, composed of two Latin words meaning "white horns," is bestowed upon it because the antennæ are chiefly white. Dr. Harris describes them as white "with the two lowest joints black." The specimens in my collection have the two lower joints and the base of the third black, and the tip is also invariably black. In some instances this black tip is so small as to be scarcely visible without a magnifying glass, but it is usually easily discernable. A few specimens have the antennæ entirely black, and answer to the description of *X. Provancheri* Cresson.* They are, however, in my opinion, only varieties of *albicornis*, as they were taken in company with those having the normal antennæ. This view is further strengthened by the fact that I have found no males with the usual white antennæ. Of four captured during the past summer, three have black antennæ and the fourth has them variegated irregularly; black predominating over the white. *X. Canadensis* (Prov.) may be merely another variety of the same insect, as it seems to differ chiefly in the colouration of the legs, which members vary considerably in my specimens in that respect; some being much darker than others.

The insect under consideration has a general resemblance, as regards shape, to the larger and well-known maple horntail (Tremex columba), to which it is closely related. It is black, with white markings, and legs of a varying shade of yellow. The females vary in size from five-tenths to eight-tenths of an inch, and are easily distinguished by the projecting ovipositor. The head is, roughly speaking, almost hemispherical, and is distinctly separated from the thorax. The front, or face, is roughened; the granulation extending above and surrounding the three ocelli borne on the forehead. The true eyes are moderate in size and not prominent. The antennæ are white, with the exception of the extreme tip, and of the first and second joints with part of the next. Occasionally they are entirely, or nearly, black. The jaws are black, and are well adapted for cutting wood, having teeth (four in number) like a little saw. The markings of the head vary somewhat in different specimens, as do also the white markings on other parts of the body. In the larger and more clearly marked ones a white oval ring, interrupted at the apex and by the roughened ridge across the front, surrounds each cheek, enclosing the

* This species is given in the Lists published by the Natural History Society of Toronto, as well as its synonym *Xiphidion Canadense* (Prov.).

eye, above which (and within the ring) is a small oblique white line. There is also a minute white dot at the base of each antenna, with a large almost square one above it.

The thorax is strongly roughened, with a triangular white patch enclosing a black dot on the shoulder, and two small spots on the back between the hinder pair of wings. The wings, four in number, are almost transparent, but have a very faint smoky tinge. The abdomen is jet black, with the exception of spots on each side, varying in number from four to six, and in size from spots to semi-bands; that on the posterior segment being the longest. The ovipositor is contained in a flattened scabbard projecting only slightly beyond the tip of the body, as about two-thirds of it are concealed within the last segment which is grooved to receive it. The full length of the ovipositor is one-fifth to one-fourth of an inch.

The male is slightly smaller than the female and more variable in colour, having the antennæ generally black, but differs essentially only in the abdomen, which is more flattened and rounded at the tip—lacking of course the ovipositor. It is very much more rare than the female; ten of the latter being observed for one of the former.

Having now sufficiently described the insects to ensure their recognition, there remains the consideration of their habits. The specimens mentioned at the beginning of this paper were taken on a tree which had recently died, and although one was in the act of ovipositing in the bark, no particular attention was given to the fact, as dead trees naturally become the prey of various species of insects, many of which may not attack them when living. A few days later, however, I found a third female upon a living tree, and having an interest in the Uroceridæ (to which group these insects belong), I determined to make further investigations concerning them this summer.

The result shows that the insect is far from being so rare as I then considered it, and that it must do no little damage to our maples, to which trees it seems to entirely confine its operations. Occasionally I have found it upon dead trees, but have usually observed it upon living ones; not only on those that are old and hastening to decay, but upon those that are young and presumably vigorous. Specimens were observed almost daily from the middle of June to the end of July, on shade trees in the city, or on trees in the neighbouring woods.

In the city the trees attacked were usually of small or medium size, and the preference thus shown by Xiphydria for young trees seems only natural when we consider its structure. Our other maple horntail (*Tremex columba*, figure 10) is a large powerful insect, armed with an ovipositor long and strong enough to deposit its eggs through the bark even of old and rough trees, and it is upon such trees, usually when they commence to decay, that it is found. Xiphydria, on the other hand, is a comparatively small and feeble insect, with a short weapon fitted only to pierce the thin and softer bark of the younger trees. It may be occasionally found upon old trees, but it is then nearly always rambling about, as if unable to find a suitable spot for depositing its eggs.

Fig. 10.

On a tree not more than two or three inches in diameter I have seen as many as eight ovipositing at the same time, and have frequently observed two or three at once upon small shade trees. Tremex in its endeavours to oviposit through the tough, thick bark of the old trees, frequently fails in withdrawing its ovipositor, and scores of such self-immolated martyrs to the propagation of their race may be seen in the autumn dead and dry. This is a fate that rarely befalls Xiphydria; indeed I have only met with one instance of a dead specimen thus anchored. Hence this insect will in many instances deposit successfully a much larger proportion of its eggs than can its larger relative, and thus stands a better chance of rapidly increasing the species.

Not having been able to cut into any of the infested trees and examine the larvæ, I am unfortunately unable to describe them. The grubs of this genus are, however, said

to closely resemble those of Tremex, which are slender cylindrical worms with a pointed horny tail. I have obtained from maple logs small larvæ of this description and probably of Xiphydria, but have not yet succeeded in breeding them. In Vol. XI. page 15 of *The Canadian Entomologist*, Mr. W. H. Patton mentions finding the pupa and larvæ of *X. attenuata* (Norton), in a stick of black birch, but he does not describe the larva, or the nature of its workings. In July last I found in a neighbouring wood a dead tree on which the bark had become shrivelled and loosened. On removing a large patch of the bark, the surface of the wood was found to be thoroughly riddled with the holes of *X. albicornis*, either empty or still containing dead insects. These had evidently been prevented from leaving their burrows by the death of the tree and consequent drying and hardening of the bark. Many others had partly penetrated the bark, and then perished from the same cause. The holes were slightly larger than would be made by an ordinary knitting-needle, and penetrated the solid wood perpendicularly to some depth.

The use of an alkaline solution, as proposed by Mr. Saunders for borers in fruit-trees, would probably be a sufficient preventive of the attacks of these insects. Such a preparation is made by diluting soft-soap with a saturated solution of washing soda, and must not be made too thin. It is liberally applied with a brush, so as to fill all crevices in the bark and give it a good coating. As the female of Xiphydria, like those of the apple-borers, seems always to deposit her eggs in the trunk below the branches, it would be quite feasible to protect in this manner shade trees in towns or districts where the insect was observed; especially recently transplanted trees, which the insect seems to single out as offering special advantages for her future offspring; perhaps because she can perceive in them a weaker vitality, even when they are apparently flourishing. The coating would have to be applied in the early part of June and again a month later, as the insects occur during the greater part of June and July.

INJURIOUS INSECTS INFESTING THE HICKORY.

Coleoptera.

By W. Hague Harrington, Ottawa.

The vital importance of a systematic preservation and renewal of our forests and groves is now widely acknowledged, and has become of late years a subject of deepest interest to those having at heart the welfare of their country, and movements in this direction have been initiated which will, if vigorously prosecuted, be productive of incalculable good. The Ontario Government, with its usual prompt desire to advance the agricultural and allied industries of the Province, has issued large editions of very valuable reports bearing upon the question in its different aspects. One of the aims of the Entomological Society is to further this good work by collecting, through the original investigations, or the studies, of its members, reliable information in regard to the injurious insects preying upon our forest and shade trees. This information plainly presented, (with a minimum of scientific terms to perplex the non-entomological reader,) will gradually give to the tree-planter that knowledge of insect-foes to be looked for that has been hitherto so liberally offered to the farmer and the fruit-grower.

So long as the forests are left in a state of nature (or recklessly destroyed), such knowledge is both difficult to acquire and to apply; but when timber trees are planted and cared for as fruit-trees are now, it will become necessary to pay close attention to insect enemies if the best results are to be looked for. Forestry reports will lack completeness until they contain trustworthy information regarding the appearance and life-history of all the insects which infest each tree. This in the present state of entomological knowledge is to a great extent impossible, and it is really surprising, when we consider the number of entomologists throughout the country, to find how little information is accessible in regard to the great majority of species. The model

reports of Fitch have been but meagrely supplemented as regards many of our trees, and, with the exception of a few well-known practical and economic entomologists, the tendency has been apparently simply to collect and describe species. Dr. Packard has recently compiled a very valuable "Bulletin on the Insects injurious to Forest and Shade Trees," which has been issued by the U. S. Entomological Commission; but, although of great assistance to a knowledge of the subject, it is necessarily incomplete, and is intended to be preliminary to a more exhaustive treatise.

In previous reports presented by our Society, descriptions have been frequently given of insects injurious to various trees, but no paper entirely devoted to those infesting a particular species, or genus, of forest tree has yet appeared. Now, however, when our forests bid fair to receive more of that attention which they so richly merit in view of their incalculable benefits to the Province, it is appropriate that our reports should contain a series of articles treating of the more important at least of our timber-trees. The present paper, as its heading shows, does not pretend to enumerate all the insects infesting the hickory, but this genus has been chosen, partly because it yields one of our most valuable woods, and partly because the writer has himself collected from these trees a large proportion of the insects to be considered.

It will require much more labour on the part of our members before a comparatively complete list can be compiled of all the injurious species. The U. S. Bulletin, already mentioned, enumerates eighty-seven species infesting the varieties of hickory, but of these only about one-half are recorded in our Canadian lists, although a majority of the remainder must doubtless occur in Canada, as well as in the United States. There are also many additional species infesting these trees which have not yet been noted. In the present paper I will confine my remarks to the coleoptera, leaving for a future paper, or to some member more competent, the consideration of the numerous species belonging to the remaining orders. The list which I now present of our injurious coleoptera infesting the different varieties of hickory contains no fewer than forty-eight species, of which only twenty-six are mentioned in the U. S. Bulletin. Thirty-three of the species have been collected by myself from these trees, and of these twenty-two are in addition to the list of Dr. Packard.

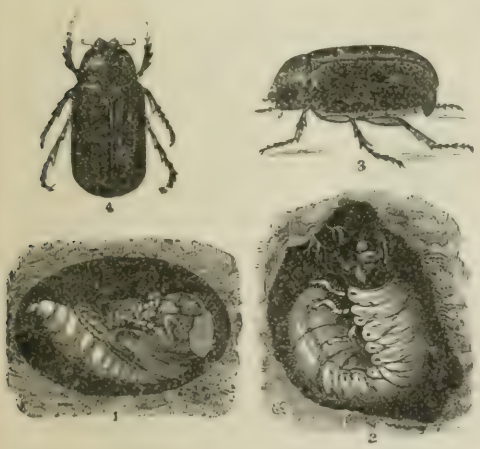


Fig. 11.

The first two beetles to be described belong to the Scarabæidæ, a family containing some of our species which are most destructive both in the larval and perfect forms, and of which very familiar examples are the May-bugs (Figure 11), *Lachnosterna fusca*, in its different stages, which represents our common species.

No. 1. *Dichelonycha elongata* Fab. is a beetle about one-third of an inch long; slender and cylindrical in shape, and of a dark colour, with the exception of the wing-covers, which are testaceous and more or less uniformly tinged with green. It is densely clothed beneath with short white hairs, and is more sparsely hairy above. The female has the thorax more densely covered with this pubescence than has the male, and is also distinguished by the shape of the abdomen. The legs are long and slender, ending in two claws which are forked at the tip, a characteristic which gives to the genus its name of "Forked claws" (Dichelonycha). This species is distinguished from several very similar ones found in Canada, by its blackish hind legs. I have found it in June feeding upon the bitter-hickory (*Carya amara*), and it also occurs commonly on hazel, elm, beech, oak, etc.

Fig. 12.

No. 2. *Osmoderma eremicola* (Knock) is a large, broad beetle, an inch in length, of a very dark mahogany brown colour. The thorax is nearly square, but is slightly rounded on the sides and narrowed in front; that of the male has a deep pit just before the middle. The thorax beneath and also the abdomen above are covered with fine, silky brownish hairs. The elytra (wing-covers) are not large enough to fully cover the abdomen, and a ring of the pubescence is exposed around them. The beetle is very smooth and shining, differing greatly in this respect from *O. scabra* (Beauv.) (Figure 12) which is frequently found on old apple and beech trees. These beetles when alive have a very strong and not unpleasant odour, which has been compared to that of Russian leather, and from which the name of the genus is derived—Osmoderma meaning "scented-skin." The name of the present species, *eremicola*, signifies a "wilderness-inhabitant." Its larvæ are large, white, fleshy grubs, very similar in shape to those of the May-bug, and are found in decaying portions of living trees. The beetles obtained by me from hickory were found in the pupa state (at which time they are inclosed in oval cocoons made from particles of the wood), in a small hollow where decay had commenced from the breaking off of a limb. They had fed upon the sappy, partly-decayed wood, enlarging the wound and causing further decay, and thus injuriously affecting the tree.

Fig. 13.

The next seven species belong to the Buprestidæ, a family containing species clad in armour often of metallic lustre, and almost metallic hardness, or varied with most brilliant colours. Their larvæ are flattened footless grubs, having the second segment behind the head very much enlarged and widened, while the following ones being very much narrower, give to them in some species a regular tadpole appearance, as in Figure 13. They bore chiefly in the stems and branches of trees and shrubs, but a few species are leaf-miners. Among well-known species of this family are the red-necked raspberry-borer, *Agrilus ruficollis* (Fab.), and flat apple-tree-borer, *Chrysobothris femorata* Lec.

No. 3. *Dicerca lurida* (Fab.) is very similar in shape to the species next to be mentioned, but the tips of the wing-covers do not diverge, and each ends in two minute spines. The colour is also a darker and more lurid bronze, whence its name. It varies in length from one-half of an inch to three-quarters of an inch. The larvæ are yellowish white, with a small head nearly buried in the first segment of the body, but armed with powerful jaws adapted for cutting through the wood. When young they bore along under the bark, forming shallow burrows in the surface layers of the wood; going deeper as they gain in size and strength. The length of time passed in this stage has not been ascertained, but is variously stated as two, three or more years. The beetles are found in summer sunning themselves on the trunks of the trees, or crawling up and down in search for their mates. They prefer trees in a weak and diseased condition to those in vigorous health, nor do they appear to attack any other kind of tree.

Fig. 14.

No. 4. *Dicerca divaricata* (Say), is the common Buprestid found during the summer and autumn on so many garden and forest trees. Its appearance and habits are so well known that they need not be again described. It is easily distinguished from the preceding species by the divergent tips of the elytra, (Figure 14) and is a somewhat larger and broader species, measuring from six-tenths to eight-tenths of an inch in length. It infests more especially beech and maple, but I have taken specimens on hickory as well as on various other trees.

No. 5. *Chrysobothris femorata* Lec. the obnoxious apple-tree-borer, has also been found by me very abundantly on dead hickories from June to September, and the fact that the larvæ live upon this tree was established by finding a beetle in its burrow under the bark. The beetle, Figure 15 *d*, (slightly enlarged)—varies in length from one-third to one-half of an inch, and is nearly half as wide. The colour is greenish-

Fig. 15.

black above and bright coppery below; some specimens (males) having the front of the head and antennæ bright green, and the legs tinged with green and crimson. Each elytron has three raised lines running lengthways, between which are irregular crosslines and punctures, and has two impressed spots. The larva, Figure 15 *a*, mines shallow, irregular, burrows under the bark in the same manner as when boring in the apple-tree.

No. 6. *Anthaxia viridifrons* Gory. This handsome little beetle was bred from hickory twigs by Dr. LeConté, and has very frequently been found by me upon the trees in summer. It is about two-tenths of an inch in length and one-tenth in width. The colour is brown with a bronze lustre, and the males have the front of the head of a vivid green, from which the name of the species is derived.

No. 7. *Anthaxia viridicornis*, (Say) I have also found abundant on hickory. It is a slightly larger species than the preceding, but closely resembles it, except that the elytra are of a bluish-black colour. Found also very commonly on elm.

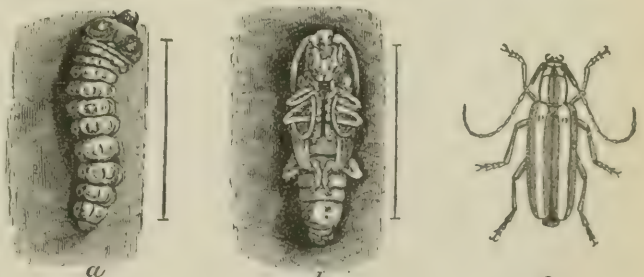
No. 8. *Agrilus egenus* Gory was also bred by Dr. LeConte from hickory twigs, and is abundant on that tree. It is a little smaller than the red-necked agrilus which bores in the raspberry stems, and is of a uniform dull bronze colour.

No. 9. *Agrilus otiosus* (Say), is very frequently found with the foregoing, and, being almost of the same size and colour, is very difficult to distinguish from it.

We next have a small beetle belonging to the Ptinidæ, the members of which vary greatly in shape, but are usually small. The larvæ of many species are very destructive, boring deeply into the wood of the trees infested.

No. 10. *Lyctus striatus* (Mels.) is a slender reddish beetle about one-fifth of an inch long. The head is prominent, not covered, as in many species, by the thorax, and the antennæ end in a round two-jointed club. The thorax is longer than wide, and the elytra are striated. It is one of the species bred by Dr. LeConte, from hickory twigs.

The extensive family of the Cerambycidæ contains, however, the great majority of our destructive borers, and to it belong no fewer than twenty-seven of the species mentioned in this paper. Its members are generally beetles of cylindrical form; lively and active in their movements, and having long slender antennæ, whence they are usually called Longicorns. The larvæ are elongated, fleshy grubs of a whitish or yellowish colour, usually with the segments distinct, and footless.—See Fig. 16, *a*, which represents the larva of *Saperda Candida* Fab., a well-known species infesting the apple-tree; *b* and *c* represent the pupa and perfect stages of the same insect.



(Fig. 16.)

No. 11. *Chion cinctus* (Drury), is a beetle about an inch in length and one-third of an inch in width. The thorax is rounded, with a projecting spine on each side. The general colour is brownish, but a greyish look is given to it by a covering of short hairs, and it has an oblique yellowish band across each wing-cover before the middle. The elytra are bispinose at the tip. The antennæ are very long and slender; those of the male being twice as long as the body. The yellowish, elongated larva burrows when young beneath the bark, and when larger sinks deeper and forms long galleries "in the direction of the fibres of the wood." (Harris.)

No. 12. *Eburia quadrigeminata* Say, is mentioned in Dr. Packard's Bulletin as "issuing from hickory trees in July, common. (McBride.)"

It is one of the longicorn beetles, and is about nine-tenths of an inch long, with a pale yellowish brown body. On the thorax are two black tubercles above, placed transversely, and a short spine on each side. On each wing case there are two double short lines of a yellow colour, and slightly elevated. The tip is two spined, the exterior spine being longest.

No. 13. *Heteracthes quadrimaculatus* Newm., was bred from branches of hickory by Dr. LeConte. This species belongs to the same family of beetles as that last referred to, but I am unable to describe it, as I have neither beetle nor description. It is, however, of very elongated form, the thorax being long and cylindrical. Antennæ long and slender; eyes large and coarsely granulated. The name signifies "four-spotted."

No. 14. *Obrium rubrum* Newm., is a delicate little beetle, about one-fourth of an inch in length, and of a reddish colour, as its name implies. The thorax is cylindrical, with a small prominence on each side. The legs and antennæ are slender, the latter being as long as the body. I have only taken one specimen, which was captured on hickory foliage on 12th July.

No. 15. *Molorchus bimaculatus* Say, is very frequently found on flowering shrubs during June and July, and differs from nearly all our Cerambycidæ in having the wing covers only half as long as the abdomen. It is a very slender beetle, one-third of an inch in length; black, with the head and thorax strongly punctured; the abbreviated elytra having each a yellowish dash almost parallel with the inner margin. The antennæ and legs are brownish; the former being much longer in the males. One of the species bred by Dr. LeConte from hickory twigs and branches.

No. 16. *Stenosphenus notatus* (Oliv.), is recorded by Riley as having been cut from hickory wood in March. It is closely allied to the beetle next to be described, but differs from it structurally in some particulars, as, for instance, in having the elytra truncated at the tip, and terminating in two spines. The thorax is rounded, without spines or tubercles; the antennæ of the females are about as long as the body; those of the males longer; legs rather short.

No. 17. *Cyllene picta* (Drury), is a very handsome beetle, so closely resembling in appearance the species *C. robiniæ* (Forst.), which works such havoc with our locusts that the beetles have been very frequently considered as the same species. There are, however, structural points by which the entomologist can separate them, while for others it is sufficient to know that the hickory-borer appears early in spring, and that the locust-borer is found in autumn, being most abundant in September. The beetle averages about three-fourths of an inch in length, and about one-fourth of an inch in width. The body is black, with yellow markings, and the legs are rust-red. The rounded thorax has four golden bands, formed of yellow hairs, across it, and the wing-covers several waved ones of the same colour, one of which forms a very distinct W. The cream-coloured larvæ of this beautiful beetle bore in every direction under the bark, making extensive excavations, which are packed with the coarse saw-dust-like chips made during the progress of this destructive work.

No. 18. *Xylotrechus colonus* (Fab.). This beetle is of a more cylindrical and narrower shape than the preceeding, and is much smaller, measuring only from four to six-tenths of an inch in length. It is of a blackish-brown colour, the wing-covers having two irregular whitish bands near the base, and the tips also whitish, with a large black spot on each, the black spots sometimes forming a band. I have found it running on dead hickory in July. It is recorded as having been "bred from oak" by Riley, and as having been found under the bark of an old sugar maple by Mr. G. Hunt.

No. 19. *Neoclytus erythrocephalus* (Fab.) is a much more slender and pretty beetle of similar shape, found on felled or dead hickories during July, and has been bred from this wood both by Dr. Horn and Dr. Le Conte. It is about one-third of an inch long and hardly one-tenth of an inch wide, the thorax being very cylindrical and as wide as the wing covers. The colour is a rusty-red, the head being of a brighter red, whence the name *erythrocephalus*, from two Greek words signifying "red-head." The antennæ are about one-half as long as the body; the elytra have four narrow yellow bands across them,

and the legs are long and slender, especially the hinder pair, which are almost twice as long as the body. This beetle is exceedingly quick in its movements, and difficult to capture, as it runs swiftly, and takes to flight instantly if disturbed.

No. 20. *Euderces picipes* (Fab.). This pretty little ant-like beetle has been found by me on hickory in July, and also on the flowers of sumachs growing among these trees. Having found it only in this one locality, it seems very probable that it bores in this tree, although (as in the case of several other species in this list) there is no direct evidence of the fact. The beetle is only one-fourth to one-third of an inch in length, and has the thorax constricted behind, so as to give it much resemblance to an ant, which it further resembles in its movements upon the flowers on which it delights to spend the sunny days. It is of a glossy black colour; the thorax is very finely wrinkled longitudinally, and the elytra are coarsely punctured, and have an ivory-like raised line running obliquely across each near the middle.

No. 21. *Typocerus velutinus* Oliv. is a very common longicorn which appears upon flowering plants and shrubs, such as spiræa and viburnum, in July and August, but I have not been able to find any record of the trees attacked by it. Having taken it on hickory and found it numerous in the neighbourhood of these trees, I place it in the present list with the conviction that future investigations will sustain me in so doing. The thorax, head and antennæ are black; the thorax being margined and sparsely clad with golden hairs, and increasing in size from the head to the base of the wing-covers. The abdomen, legs and elytra are of a rusty-red, the latter having four golden bands. Length averages about six-tenths of an inch.

No. 22. *Leptura proxima* Say occurs with the preceding species and is also common. It is about the same size, but has the thorax constricted behind and is entirely black, with the exception of the elytra, which are ochre yellow with black tips. As an example of the scanty knowledge regarding the habits of longicorns, I may say that out of some seventy-five species belonging to this genus in the United States and Canada, only one is mentioned among the "Insects Injurious to Forest and Shade Trees."

No. 23. *Dorcheschema nigrum* (Say) is of a velvety black colour and from four-tenths to five-tenths of an inch in length. The thorax is cylindrical; not constricted at the head, and but slightly behind. The wing-covers widen slightly toward the tips, which are rounded, and they are coarsely punctured. The lower surface of the body and the legs are clothed with short white hairs. The antennæ are very long and slender. I have found the beetles issuing from dead trees in June, and they are abundant during that and the following month, both on dead and felled wood, and on the trunks and foliage of living trees.

No. 24. *Goes tigrinus* (DeG.) is, according to Fitch, probably the most destructive of all the beetles boring in hickory; attacking not only dead wood but infesting trees apparently sound, and greatly injuring them. The average length is about an inch, some of the males being less and some of the females more. The general colour is a reddish-brown, but the beetle has a tawny appearance owing to the short hairs which cover all the under surface and much of the upper. The antennæ are not quite so long as the body; the two lower joints are swollen and brown, the remaining ones slender and pale. The thorax has on each side a blunt conical spine. The elytra appear to have a brown band at the base and a similar one behind the middle, due to the absence from these portions of the short hairs that clothe the rest of the body. The beetle appears in summer and the female deposits her eggs in holes which she gnaws in the bark. The larva when hatched feeds beneath the bark on the sappy layers of the surface wood, but as it becomes larger and stronger it sinks gradually deeper and bores a burrow, increasing in size with its own growth, upward toward the centre of the tree. It is a soft, gradually tapering grub of a yellowish colour; about an inch long and one-fourth of an inch wide across the broadest segment—the second from the head. When it feels that its life in this form is about to end, it turns and bores outward to the bark, through which, after the usual metamorphoses, the beetle makes its exit.

No. 25. *Goes pulcher* (Hald.). The "Beautiful Goes" infests the shag-bark and pig-nut hickories. It is a rarer and somewhat larger species than the former, but closely resembles it, and its habits in the larval form are probably the same.

No. 26. *Goes oculatus* Lec. is a much smaller species, of the habits of which I have not been able to find any mention. The beetle is rare, and I have only taken two specimens. These were a pair captured on hickory in the end of June, and which were copulating when taken. They are hardly half an inch long, and are black, densely covered beneath with short white hairs. The pubescence above is more sparse and scattered, and the coarse puncturing of the elytra gives them a mottled appearance. There is a black spot on each elytron just behind the middle, and the presence of these spots gives to the beetle its distinctive name of *oculatus* or "eyed."

No. 27. *Goes pulverulentus* (Hald.) is a fourth species of the same genus and resembles very closely Nos. twenty-four and twenty-five. It is recorded by Dr. Horn as very destructive in the United States to living beech-trees, of which it attacks the larger branches, and bores in them large burrows several inches long. This is the only notice I find of its habits, but it is probable that it bores also in hickory, as I have taken several specimens on bitter hickory in July and August. The chief points of distinction between this species and *tigrinus* appear to be in the vesture of the elytra and the length of the antennæ. Their size and general colour are about the same, but the elytra of *pulverulentus* are uniformly clad with short hairs, and have no appearance of dark bands. The antennæ (at least in some specimens) are slightly longer than the body.

No. 28. *Acanthoderes quadrigibba* (Say) is reported by Schwarz as boring in the dead twigs of oak, beech and hackberry, and it has been bred by Dr. LeConte from small branches and twigs of hickory. It differs considerably in shape from the beetles of the preceding genus, being broader and flatter. It is about one-half of an inch long, and one-fifth of an inch across the base of the wing-covers. The thorax, in addition to two lateral spines, has two more above, whence the name *quadrigibba* or "Four-horned." The legs are nearly of a uniform length, and the thighs are much enlarged. The general colour is a mottled grey, due to pubescence, and there is a "moderately broad transverse band of white in front of the middle."

No. 29. *Leptostylus macula* (Say) is a very pretty little species about one-third of an inch in length. The antennæ are longer than the body; brown, with the joints black. The thorax is cylindrical, without spines, and with the sides white, bordered above by a black line. The general colour is brown, spotted with black, and there is a large white spot on each wing-cover beyond the middle. In some specimens these spots together form a broad white band across the back. The elytra are not twice as long as wide, and are rounded and deflected at the tips. The legs are as in the preceding species. Fitch in his reports states that the larvæ of these beetles may at times be found very abundantly under the bark of old butternut trees. I have taken specimens upon butternut, but not so frequently as upon the bitter hickory. A slightly larger and broader species *L. aculifer* (Say) is found upon the apple-tree occasionally.

No. 30. *Liopus alpha* (Say) is one of a groupe of small long-horned beetles which bear a close resemblance to one another in shape and size, as well as in their habits of boring the small branches and twigs of various trees. Their larvæ are rather slender, and are covered with fine hairs; they feed under bark, and are said to be fully grown in the autumn of the first year. The only record I can find of the habits of *L. alpha* is one by Riley, of their boring in dead apple-twigs and issuing in May. The date of appearance varies of course with range of habitat. My specimens have been chiefly taken in July. The beetle is about one-fifth of an inch in length; of an ashy-grey colour, with the exception of an angulated black band across the tips, and a black line along the anterior margin of the elytra. The antennæ are very slender, and half as long again as the body. Fig. 17, which represents the apple liopus, *Liopus facetus* Say, will give the reader a general idea of the appearance of the insects belonging to this genus.

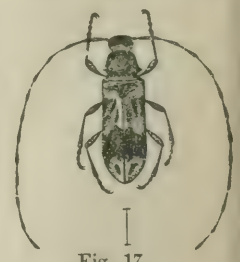


Fig. 17.

No. 31. *Liopus cinereus* (Lec.) is almost identical in appearance with the preceding, and is distinguished mainly by the coarser puncturing of the surface of the elytra. It was bred by Dr. LeConte from twigs of hickory.

No. 32. *Lepturges querci* (Fitch) is of the same shape and size, but is more variegated

in colour. The head and thorax are black; the antennæ twice as long as the body, and pale, with the tip of each joint black. The yellowish elytra have a black transverse spot behind the scutel, and a broad, angulated, black band behind the middle. In front of this band are several short black lines, and between it and the tips are black dots. This species received its name from Fitch, because it was captured upon oak trees by him, and believed to live upon them. This appears to be all that can be learnt of their history. All of my specimens have been captured upon hickory, either on the bark of felled trees, or among the foliage of living ones.

No. 33. *Hyperplatys aspersus* (Say) is nearly one-fourth of an inch in length, and of an ashy-grey colour, with the upper surface sprinkled with small black dots, and with an interrupted black band behind the middle of the elytra. It is reported by Schwarz as boring in dry twigs of *Populus monilifera* at Columbus, Texas; the perfect insects being found throughout the spring and summer. It is not uncommon here upon the bitter-hickory in company with Nos. 30, 31, and 32.

No. 34. *Ecyrus dasycerus* (Say) is of nearly the same size and resembles somewhat in shape the Spotted Leptostylus (No. 27). The thorax has feebly rounded sides, without any tubercle, or angulated spine, as in the preceding four species. The pubescence is close and short, and the beetle is of a brownish or greyish-brown colour, with a somewhat mottled appearance. The antennæ are as long, or a little longer, than the body. It is one of the species bred from hickory by Dr. LeConte.

No. 35. *Eupogonius vestitus* (Say) has been bred from hickory by Riley. It is about one-third of an inch in length, of a chestnut-red colour, mottled with short yellowish pubescence, and clothed (as its name indicates) above with longer dark hairs arising from punctures in the surface. The head and thorax are darker and more closely punctured than the elytra. The legs and antennæ are also hairy, the latter being as long as the body. The only specimens which I have taken were found upon wild raspberry bushes.

Fig. 18.

No. 36. *Oncideres cingulatus* (Say) is a species of very curious and interesting habits. When the female desires to deposit her eggs she does so in punctures made in the bark of small branches or twigs, usually from one-fourth to one-half of an inch in diameter. After this operation, or before it (according to different authorities), she gnaws a ring just below where the eggs are deposited; so girdling the twig that it usually breakes off during the winter storms and falls to the ground. Fig. 18 shows the beetle in the act of thus girdling a slender branch. Where the twig fails to break off, it is nevertheless killed, and the larvæ feed in the dead wood. The beetle is about six-tenths of an inch long, with cylindrical unarmed thorax, and antennæ longer than the body. Its colour is a greyish-brown, and it has a broad grey band across the elytra covering their middle third. It is widely known as the "Twig-girdler," and infests a variety of trees, including the apple and pear.

No. 37. *Saperda discoidea* Fab. belongs to the same genus as the Striped-borer of the apple, and is of similar shape, but smaller. The colour varies from brown to black, the males being the darker. The pubescence with which the head, thorax and under surface is clothed also varies from yellowish to grey. It appears to be very rare in this vicinity, but is, I believe, more common in western Ontario. Reported by Fitch and Riley as boring in hickory, and also bred therefrom by Dr. LeConte.

The next beetle belongs to the Chrysomelidæ, a family containing many species, feeding upon the foliage of plants and doing serious damage. Among them may be mentioned the potato-beetle, cucumber-beetle and grapevine flea-beetle. A number of species must undoubtedly feed more or less upon the hickory; but none are enumerated in Packard's Bulletin, and I have not been able to find notices of any elsewhere. Unfortunately my own notes in this direction are so scanty that I can only find a record of one species.

No. 38. *Systena marginalis* (Ill.) is a small, elongated beetle of a lemon-yellow

colour, and having the thorax and elytra margined with black. It belongs to the flea-beetles and is very active. It is abundant upon elm, oak, etc., in the summer and autumn; and in the early part of September (1882) I found it in great numbers feeding on the foliage of the sweet hickory.

The remaining species to be mentioned belong to the division of coleoptera known as Rhyncophora or snout-beetles, because the head is prolonged more or less into a beak. This division contains a great number of small, or moderate-sized, species, of very obnoxious habits, as the larvæ live generally in seeds, under bark, or in the roots, etc., of plants. The first five species belong to the family Curculionidæ.

No. 39. *Magdalis barbita* Say is a black species about one-fourth of an inch long. The thorax is closely punctured, and the rounded sides project in front in a short, acute tubercle. The head is prolonged into a slightly curved beak, not deflexed, and as long as the thorax. The elytra have deep punctured striæ, and are as long as the head and thorax together. The scutellum (a small plate at the base of the elytra) is covered with white hairs. The beetles are found during the summer months puncturing the bark of felled and dead hickories, and the larvæ live in great numbers in the bark or between it and the wood. I have found the beetles most abundant from 15th to 30th June. A species almost identical with this, viz., *M. olyra* (Herbst.), is stated in the U. S. Bulletin to bore under the bark of the oak, and a smaller and smoother species with a bluish tinge, *M. inconspicua* Horn is very abundant on our pines.

No. 39 A. *Magdalis olyra* Herbst. Since the preceeding paragraph was written, and in type, I have received the January number of the "Quarterly Journal of the Boston Zoölogical Society," in which Mr. F. C. Bowditch describes this species as always found by him to infest various species of *Caryæ*. The larvæ "tunnel the bark in every direction, leaving only just enough tissue to prevent the bark warping away from the tree." "As far as my observations extend, the species appears to prefer small trees, from four to six inches in diameter." "If the tree is small and very badly infested it dies very quickly; and shortly after the beetles have escaped the bark is apt to flake off, or curl up in quite large pieces." As this beetle is also found in Canada, it will add one more to the present list, thus making the total number forty-nine.

No. 40. *Anthonomus suturalis* Lec. is a pretty little weevil also found very abundantly on the bitter hickory. It is black and punctured, but shining, and the elytra have each a large red spot (varying in size) extending from the tips almost to the middle. The beak is longer than the thorax, and bent down, instead of projecting forward as in the preceding species. In regard to the actions of this beetle upon the hickory, I am unfortunately in ignorance; but it is known to attack cranberry-vines in the United States, by laying an egg in the fruit-bud and then cutting it off; the larva feeding in it upon the ground.

No. 41. *Conotrachelus posticatus* Boh. very much resembles in shape and colour *C. nenuphar* (Herbst.), the well-known plum curculio, but is smaller and without tubercles on the elytra. There are, however, upon the elytra slightly elevated ridges between which are rows of punctures. Across the elytra, near the tips, is a yellowish band. It occurs upon the foliage of the bitter-hickory during the summer months. An allied species, *C. elegans* (Say) is described by Packard as "laying its eggs in the partly rolled up leaves of the pig-hickory (*Carya porcina*) and during the process cutting off the leaves, which hang down, wither, and turn black."

No. 42. *Acoptus suturalis* Lec. is a small black beetle, densely clothed beneath and more sparsely above with short yellowish hairs. The elytra are striated and in unrubbed specimens have a wide band of yellowish pubescence across the base, and a narrow one near the tips, which are black, as is also the space between the bands; a white line along the suture interrupts the basal band. Found in abundance on dead hickories, in the bark of which it bores in company with No. 39.

No. 43. *Balaninus nasicus* Say is named the "Hickory-nut weevil" in Packard's Bulletin, and according to Riley breeds entirely on hickory-nuts. Harris, however, considered it probable that it bred in the nuts of the hazel, because found paired on hazel-bushes in summer. In this neighbourhood it is never found on hickory so far as I am aware, and frequents the hazel almost entirely. Some years it is very numerous

on these bushes, and the nuts correspondingly worm-eaten. It is nearly one-third of an inch long (exclusive of the beak) and of an oval shape; being widest across the base of the wing-covers. It is densely clad with very short yellowish hairs and has a somewhat variegated or mottled appearance, especially on the elytra, due to patches of darker hairs. The beak is very long, slender, curved, and almost black.

No. 44. *Balaninus rectus* Say is generally known as the acorn-weevil, and is also believed by Riley to infest hazel-nuts. It is of the same size as the preceding species, but much lighter in colour and distinguished by its more slender and less curved beak, which in the female is longer than the whole body. This species is much more rare (around Ottawa) than the preceding, but I have taken several specimens on hickory, so that as regards this locality at least I am disposed to regard it as usurping the claim of *B. nasicus* to be considered the hickory-nut weevil. A few specimens also occur on oak.

The following three species belong to the Scolytidæ, which are small, and often minute, cylindrical beetles boring in the bark and surface wood of various trees, and at times destroying immense quantities of valuable timber.

No. 45. *Xyleborus celsus* Eich. is a small species bred from hickory twigs by Dr. LeConte, and is recorded as found in Canada, but is not known to me.

No. 46. *Scolytus quadrispinosus* Say is from one-sixth to one-fifth of an inch long; entirely black, or black with brown elytra. The elytra have rows of deep punctures forming striæ, between which are rows of hardly perceptible punctures. This beetle attacks the different varieties of hickory and is very destructive. The female bores a little tunnel under the bark and deposits eggs along it. The larvæ when hatched make other tunnels out from this and thus loosen the bark; they are short, stout, footless grubs.

No. 47. *Chramesus hickoriæ* Lec. is a small species also bred by Dr. LeConte from the twigs and branches of hickory.

The remaining beetles on my list of injurious species belongs to the family Anthribidæ.

No. 48. *Hormiscus saltator* Lec. is a minute cylindrical black species not more than one line in length, with a short broad beak and antennæ ending in a small club or knob. The thorax is closely punctured, and the elytra punctured in rows. It is found on the hickory in June, and probably bores in the bark.

Further observations by our members will probably largely increase the foregoing list, as I know that other species have been taken by me on hickory, of which I have kept no notes. There are also three injurious species which I have captured on these trees, but which I have not yet determined.

There are also many beetles infesting these trees, of the habits of which but little is known, so that I am unable to say whether they do any injury or not. Among such are species of Cistelidæ, which are found abundantly on the foliage or under the bark.

As regards the measures to be taken against the ravages of these destructive beetles, there can be offered at present merely suggestions. For those boring in the bark and larger branches of the trees, it is probable that the soapy alkaline washes used as preventives against the borers in fruit trees will be equally effective. The species which infest the smaller branches may be checked by careful prunning and burning in the autumn of all diseased and dead twigs. As, also, a large number of species breed in dead and felled timber, it is evident that the presence of such wood will attract the beetles and help to increase their numbers. Timber when felled should be immediately hauled away to a place of safety, and all the refuse burnt. All badly diseased trees and standing dead timber should be felled and disposed of in the same manner. Those beetles which are so numerously attracted to flowering shrubs, in the vicinity of the trees in which they live, might be profitably collected and killed by children armed with sweeping or beating nets. The gathering of all nuts which fall to the ground and feeding them to pigs, or burning them, would soon diminish the ravages of the nut weevils.

Although it was not my intention in the present paper to make any mention of the various species of beneficial insects which I have observed on the hickory, I cannot refrain from making a few remarks regarding two beetles bred by Dr. LeConte from hickory twigs, viz.: *Chariessa pilosa* and *Phyllobænus dislocatus*. To those unacquainted

with the habits of the family Cleridæ, to which they belong, it might be supposed from finding these beetles mentioned, without comment, in the "Bulletin of Insects Injurious to Forest and Shade Trees," that they were injurious species. The larvæ of the Cleridæ, however, whose habits are known, are carnivorous, and it is therefore probable that the species in question merely lived upon the larvæ of some of the injurious beetles. I have already recorded (Can. Ent., Vol. XV., p. 80) the fact that *Chariessa pilosa* was found by me in the act of devouring specimens of Nos. 8 and 39 of the present list; thus proving itself in the perfect form at least to be a decidedly beneficial species. Several other species of this family are commonly found upon the hickory, and are all probably the opposite of injurious to them.

INSECTS INJURIOUS TO THE WHITE PINE—*Pinus strobus.*

By Wm. Saunders, London, Ontario.

More than one hundred species of insects have been enumerated as destructive to the white pine, some attacking the wood, others the bark, twigs or leaves, and while some of them do comparatively little harm, others are very injurious. In the present paper reference will be made mainly to those which do the greatest injury to this our most valuable timber tree, briefly sketching their life history, and habits as far as they are known. The losses occasioned by the destructive work of borers are unfortunately too well known to those engaged in the lumber trade, although the sufferers in most instances know but little of the curious transformations which these insects undergo. These specially destructive species inflict their greatest injuries during the larval period of their existence, in which condition some of them continue their work for several years before reaching maturity. Most of these pests belong to one of two families of beetles, the longicorn, or long-horned beetles (*Cerambycidæ*), or the serricorn, or saw-horn beetles (*Buprestidæ*). The cylindrical bark-beetles are also injurious, but as they operate chiefly near the surface, immediately under the bark, they do not injure the timber to any material extent.

Monohammus Confusor.

Among the most formidable enemies in the family of long-horned beetles are two species belonging to the genus *Monohammus*, and known as *Monohammus confusor* and *M. scutellatus*. *M. confusor* is a large grey beetle, remarkable for the extraordinary length of its antennæ or horns. This insect is shown in fig. 19. The body varies in length from an inch to an inch and a-half, the average size being over an inch. Its general colour is ashen grey, mottled with darker spots and dots; there are also patches of a whitish colour on the head, thorax and abdomen, which are sometimes indistinct or almost wanting, the colours being chiefly due to a covering of very fine, short hairs, which, as they are easily rubbed off, occasion these variations in the appearance of the insect. The antennæ of the males vary in length from two to upwards of three inches; those of the female are much shorter, and seldom exceed the length of the body. During the summer the female lays her eggs in the crevices of the bark of the white pine trees, frequently selecting those which have been scorched by fire or felled by the wind or the lumberman's axe.

Fig. 19.

The larva when hatched soon eats its way into the wood, where it forms channels or galleries through and through the solid interior. When full grown it is a large, soft, white grub, nearly cylindrical in form and destitute of feet. The head is large, of a reddish-brown colour, and is armed with a pair of powerful jaws; the next joint behind the head is flat and horny, and larger than the others, the body tapering a little from this point backwards. The chrysalis state is passed within the burrow, and the beetle appears late in June or during the month of July. As this insect lives a long time in the larval state, the beetle is often developed after the timber has been built into a house, when, suddenly emerging from its concealment, it becomes a source of wonder to the inhabitants of the dwelling. When burrowing into the wood, the larva makes a noise not unlike the boring of an augur, which on a still night may be heard in the woods for a considerable distance, and such noises occurring in a house where the cause has not been suspected has often given rise to superstitious notions and excited in the timid much alarm. This beetle is very generally distributed throughout the Northern United States and Canada, and in the lumbering districts is sometimes excessively abundant. One instance is on record where nearly three hundred of the beetles were seen at one time on a single pine tree. As these insects are partial to cut timber, they often greatly injure logs which are allowed to remain a season over in the mill-yard.

Monohammus Scutellatus.

This beetle derives its specific name from its white scutellum situated at the junction of the wing-covers with the thorax. It varies in length from three-quarters of an inch to an inch, and usually occurs most abundantly in June. In fig. 20 we have a very good representation of this insect. The body is black above and below, and thickly pitted with irregular impressions. On the wing-cases there are a number of scattered whitish spots of various shapes and sizes, which, when examined with a magnifying lens, are found to be formed of dense clumps of short, whitish hairs, which often disappear by being rubbed off. On each side of the thorax is a thick, triangular spine; the antennæ are many-jointed, and in the female are about the same length as the body, while in the male they are nearly twice that length.

Fig. 20.

The larva of this insect is also a thick, white grub, without feet. The body is divided into a number of well-marked segments, the head as in the species last described being furnished with a strong pair of jaws. This larva infests the white pine chiefly after the lumber has been cut or newly fallen, and injures it by boring large, oval-shaped cavities, which extend for long distances through the interior of the log. In some localities these insects are very plentiful, literally swarming on pine trees, They are common in the lumbering regions of Canada and the Northern States.

Criocephalus Agrestis.

Another injurious beetle belonging to the same family, but having much shorter horns, is known under the name of *Criocephalus agrestis*. This beetle is of a blackish-brown colour, with three large irregular indentations on the top of the thorax and two ridges on each of the wing-covers. The antennæ are about half the length of the body. The eggs of this insect are laid on the pine trees, and the larva when hatched bores into the wood, perforating the trunk in all directions, making a flattened cylindrical hole. When full-grown it is about an inch long, is white, footless, with a brown head. The anterior portion of the body is somewhat thicker than the hinder segments. The larva changes to a chrysalis within its burrow, and produces the beetle late in May or early in June.

The Lesser Orthosoma—*Orthosoma brunneum.*

This is a long-horned beetle of a rather flattened form, about an inch and a-quarter long and about one-third of an inch broad—see fig. 21. It is of a deep red colour, darker anteriorly; on each side of the thorax there are three sharp teeth and several slightly elevated lines on the wing-covers. The larva is about an inch and a-quarter long, cylindrical in form, and of a whitish colour. The beetles are very common during the months of June and July, and the larvæ are frequently met with in decaying pine stumps. Since they feed chiefly on decaying wood they do but little harm.

Fig. 21.

There are several other smaller species of longicorn beetles which injure pine trees, but as their habits are very similar to those of the larger species to which reference has been made, it will perhaps be unnecessary to speak further of them now.

The Virginian Buprestis—*Chalcophora virginiensis.*

Among the Buprestidæ, or saw-horn beetles, the Virginian buprestis (*Chalcophora virginiensis*) will first claim attention. This is a large and handsome beetle, which measures from eight-tenths of an inch to an inch or more in length. It is of an oblong form, and brassy or copper-coloured, sometimes almost black. The upper side of the body is roughly punctated, the top of the head deeply indented, on the thorax there are three elevated and polished thick black lines, and on each wing-cover two small, square, impressed spots, a long, elevated, smooth, black line near the outer margin and another near the inner margin, with several thinner, shorter lines between them. The under side of the body has a coppery lustre, and is sparingly covered with short whitish down. It appears towards the end of May, throughout June, and occasionally later. The larva is a flat-headed white grub, with its anterior segments very much enlarged, which bores into the sap-wood of the white pine, and sometimes girdles the tree; its track begins as a narrow shallow groove on the surface of the wood, increasing in breadth as the larva grows, following an irregular course, and terminating in a large hole, at which point the grub changes to a chrysalis.

The Liberated Buprestis—*Chalcophora liberta.*

This is a closely allied species, much resembling the Virginian buprestis in all its stages. The beetle is about three-quarters of an inch long, of a brassy or coppery hue, sometimes glossed with green, in other specimens nearly black. The thorax and wing-covers are deeply furrowed by irregular longitudinal depressions. It differs from *Virginiensis* in the width and character of the raised lines on the wing-covers.

Dicerca Tenebrosa.

Is another member of the family of Buprestians which is an enemy of the white pine. This species in the larval state mines under the bark of the tree, where it occurs as a medium-sized whitish grub, with a flat head, brown jaws, and enlarged anterior segments. The beetle occurs late in the summer, is of an ashy-bronze colour, with the thorax and elytra more or less furrowed, and densely pitted. The under surface is copper coloured. This insect is found in most parts of Canada and the Northern United States.

The Golden Buprestis—*Buprestis striata.*

This species also deserves mention here. It is a very handsome beetle, from six to seven-tenths of an inch long, of a coppery-red colour, with a broad bluish-green stripe on each wing-cover, which varies in brilliancy in different specimens. There are four raised smooth lines on each wing-case, and a wide, shallow groove along the middle of

the thorax. Both thorax and wing-covers are pitted with minute dots. The larva of this species, which is very similar to that of *tenebrosa*, is occasionally found in sound pine logs, but much more frequently in decayings logs and stumps.

Harris' Buprestis—*Chrysobothris Harrisii.*

This lovely little beetle measures about one-third of an inch in length. The female is of a beautiful metallic green all over; the male has the legs and the sides of the thorax of a reddish-bronze, with a purplish tinge towards the tips of the wing-covers. The thorax has a conspicuous furrow down the centre, and is marked with some irregular indentations, which are repeated also on the finely-punctured elytra. The beetle is found on white pine saplings towards the end of May and in June; the larva lives under the bark of young trees and in the smaller limbs of older trees.

Cylindrical Pine Borers.

Eight species of cylindrical bark beetles belonging to the family *Scolytidæ* are known to attack the white pine, of which perhaps the boring Hylurgus (*Hylurgus terebrans*) is one of the most common, and since they are all very similar in their appearance and habits, this may be taken as a representative species. The beetle is about a quarter of an inch long, of a nearly cylindrical form, a chestnut-red colour, and is thinly clothed with yellowish hairs. It is found in abundance in May in pine forests and amongst lumber in mill-yards and elsewhere throughout the greater portion of North America. The larva is a small, yellowish-white, footless grub, with a yellow, horny head, which bores winding passages in many directions in the inner layers of the bark of the tree, and also in the outer surface of the wood.

Xyleborus xylographicus (fig. 22) is another member of this family, which has proved to be a formidable enemy both to the white pine in the north and to the yellow pine in the south.

Fig. 22.

The Pales Weevil—*Hylobius pales.*

Among the weevils, or snout beetles, there are also several species which injure the white pine, one of them is known as the pales weevil (*Hylobius pales*). It is a dark chestnut-coloured or black weevil, from three to four-tenths of an inch long, sprinkled with dots more or less bright, which are found, on magnifying them, to be clusters of very fine, short, yellowish-gray hairs. These insects are quite common in May and June among pine trees, and lumber piles. The female perforates the bark of the tree with her snout and in the excavation deposits an egg, where it shortly hatches into a white or yellowish-white larva, which burrows beneath the bark, consuming its substance and loosening it from the wood. In the autumn the larva bores into the sap-wood, forming a cell nearly a quarter of an inch deep, arched over the top with a roof of sawdust and woody fibre. Within this enclosure the larva changes before spring to a pupa, from which the beetle escapes early in the summer. It is found from Maine and Lake Superior to Florida.

The White Pine Weevil—*Pissodes strobi.*

This is a common weevil met with at all times during the season, but most commonly in May. They affect the upper shoots of the trees, depositing their eggs in the bark of those which are young and growing thriftily. When hatched the young larvæ devour the wood and pith, causing the shoots to wither and die. The leading shoots being destroyed, the trees become irregular in their growth and much distigured. The larva is white, and about one-third of an inch long. The beetle (see fig. 23) is of an oblong, oval form, rather narrow, about a quarter of an inch long, of a dull dark brown colour, with two dots on the thorax, and a short, irregular, white band behind the middle of the wing-covers. They are also ornamented with a few patches of tawny yellow.

Fig. 23.

The Woolly Bark Louse of the Pine.

This is an insect which, in some localities, is very destructive to the white pine. Large patches are frequently found on the trunk and branches covered with a white, cottony secretion, under the protection of which live myriads of tiny lice. These puncture the bark with their sharp beaks and feed upon the sap, thus exhausting the trees, and sometimes causing their death. Large numbers of these lice are destroyed by lady-birds, who feed on them both in the larval and perfect state. Two species are especially useful in this instance. One is shown in fig. 24, where it is represented in its three stages. This is known as the painted lady-bird (*Harmonia picta*); the other is black, with two red spots, and is called the twice-stabbed lady-bird (*Chilochorus bivulnerus*). The larva is shown in fig. 25.

Fig. 24.

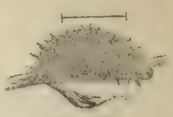


Fig. 25.

Pine Leaf Scale Insect—*Chronaspis pinifoliæ.*

Another allied species is the pine-leaf scale insect (*Chionaspis pinifoliæ*, Fitch). The leaves of the pine are sometimes found to be covered with innumerable elongate, snowy-white bodies, which, on examination, are found to be the scales of an insect; these when abundant give to the whole foliage a whitened appearance, and, if the insects are allowed to pursue their course unchecked, the leaves shortly become yellow or brown, and the trees languish and occasionally die. In fig. 26 is shown a tuft of leaves injured

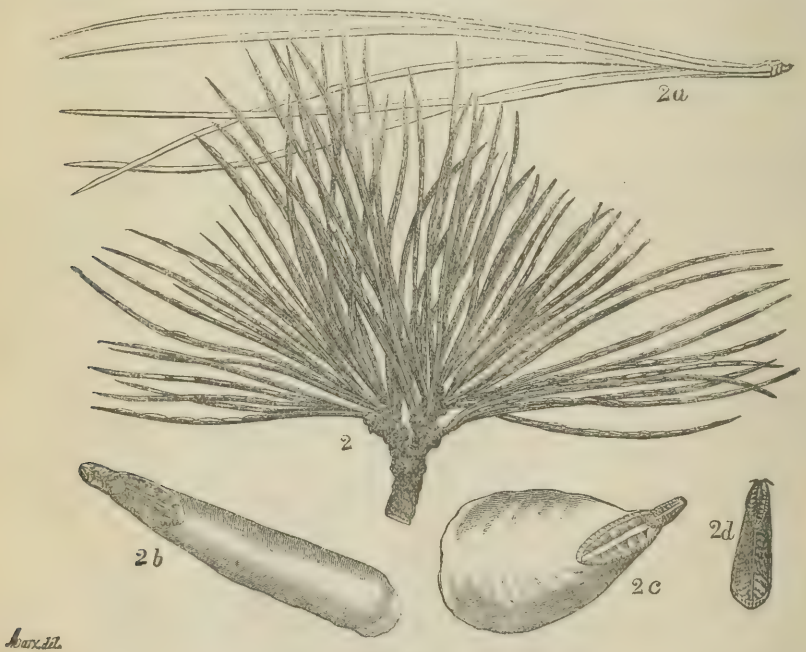


Fig. 26.

by this scale insect. The scale of the female, shown at 2*c*, is about one-tenth of an inch long, that of the male, shown partly grown at 2*d* and mature at 2*b*, is not more than one-thirtieth of an inch. Both male and female scales are much magnified in the figure. This insect has not yet proved troublesome in forests, but has chiefly affected trees in cultivation. It very closely resembles a species found on cultivated pines in Europe, and may possibly prove to be the same. The eggs are produced under the female

scales, from fifteen to thirty under each scale; they are oval in form and of a red colour. The larvæ hatch early in May, and are also red. When first hatched the young females move briskly about until they have selected suitable locations for a permanent abode, when they attach themselves thereto and remain fixed. The males are less active, and often attach themselves to the leaves in the immediate neighbourhood of the parent scales. This insect produces at least two broods in a year, perhaps more, and is found throughout the United States from New York to Florida.

The White Pine Saw-Fly—*Lophyrus Abbotii.*

This species belongs to the family of saw-flies, a class of insects which are said to have greatly injured whole forests of pine in Germany. This American saw-fly is abundant in Indiana, Illinois, and Missouri, and is generally distributed elsewhere through the Northern and Western States and Canada. Fig. 27 represents the insect in its several stages. The larva is from eight-tenths of an inch to an inch in length, of a dingy white colour, with a black head, and several longitudinal rows of black spots along the body, and is found most numerous in the autumn. When full fed they enclose themselves in oval cocoons, which are sometimes spun up among the leaves on the tree, but more frequently among the fallen leaves and other debris on the ground. Within the cocoons the larvæ remain unchanged until the following spring, when the pupa is formed, from which the flies issue in about two weeks The male measures, when its wings are spread, about half an inch the female two-thirds of an inch across. The body of the male is black excepting the under side and tip of the abdomen, which are yellowish. The female is of a honey-yellow colour, with the head and thorax a little darker, the thorax with the abdomen being slightly marked with black. The wings are transparent, with black veins. The larvæ feed in flocks, and seldom leave a twig or branch until they have completely stripped it. When approaching full growth they consume a large quantity of food, and strip a tree of its leaves with wonderful rapidity. When disturbed they have the habit of throwing back the head and ninder part of the body, and if the tree or branch is violently shaken many of them will fall to the ground. A large proportion of these larvæ are destroyed by a parasitic fly.

Fig. 27.

The Pine-boring Pyralid—*Nephopteryx Zimmermani.*

In the months of June and July branches of the white pine often show that they are suffering from the attacks of an insect by the pitch which exudes; the wounds usually occur below the insertion of the smaller branches near the top of the terminal shoots. On cutting into the affected part, the injury is found to be caused by a small larva which, when full grown, is nearly three-quarters of an inch long. The head is shiny-brown, with black mandibles, the body blackish-green, naked, with a few black dots on each segment, from each of which arises a single rather stout hair. The larva devours the inner side of the bark, and making furrows in the wood, causes the exudation which, when excessive and continuous, especially in the case of young trees, sometimes proves fatal. In July the larva spins a thin, whitish, papery cocoon in the mass of exuding pitch, which seems to act as a protection to both larva and chrysalis. The chrysalis is smooth, and of a blackish-brown colour, and produces the moth in from ten to fourteen days. The moth, when its wings are expanded, measures an inch or more across. It is of a blackish-grey shaded with reddish, the hind wings are pale yellowish-white, and the abdomen greenish ringed with dull white. The species is probably single-

brooded. From the fact that the exuding pitch offers so much protection to the insect, it is scarcely likely that any remedy would reach it. The knife seems to be the only resource. A small four-winged parasite attacks the borer in the larval state, the chrysalis being often found filled with the cocoons of this useful friend.

Comstock's Retinia—*Retinia Comstockiana*, Fernald.

This insect as yet has only been observed on the pitch pine (*Pinus rigida*), but as it is probable that it will sooner or later be found to attack the white pine it will be briefly noticed.

The perfect insect is a small moth of a light grey colour, varied with darker shades of rusty brown, which measures, when its wings are spread, nearly three-quarters of an inch across. The eggs are laid on the terminal shoots of the trees, and the larvæ are found in the early part of the summer boring into the twigs and small branches, causing an exudation of resin, and sometimes girdling them. The larvæ, when full-grown, are nearly half an inch long, of a yellowish colour, with a brown head, a patch of the same colour on the next segment, and a few polished brown dots on each ring, and from every one of these there arises a single hair. The larva changes to a chrysalis within the burrow from which eventually the moth escapes. In fig. 28 we have the insect represented in its several stages, also a small branch of an affected tree and a section of one of the bored twigs.

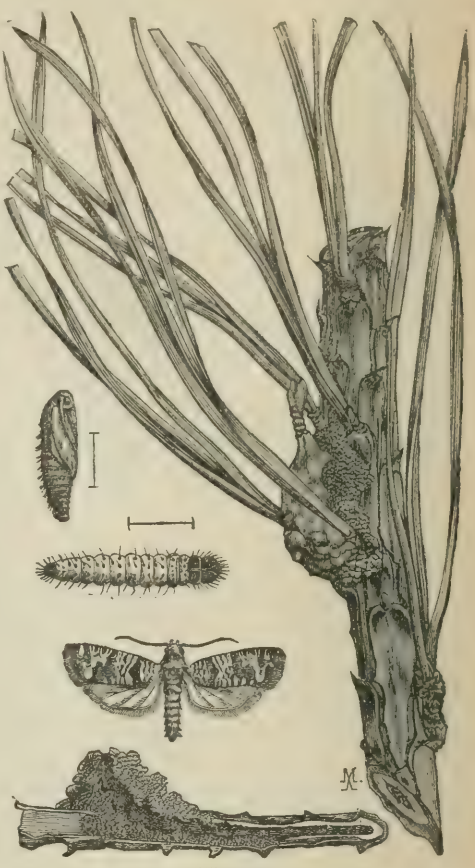


Fig. 28.

The Pine Leaf-miner—*Gelechia pinifoliella* (Comstock).

This insect was first described by Prof. Comstock in his report to the Department of Agriculture, Washington, for the year 1879. It has been found mining the leaves of different species of pine in many parts of the United States, and although as yet unrecorded in Canada, will very probably be found here. The larva is very minute, in the figure it is much magnified; the line below indicates the natural size. It lives within the leaf on the soft tissues, and its presence is soon indicated by the change in colour which takes place in the part affected; it becomes brown, and on examining the leaf, or that portion of it which is discoloured, it is found to be entirely eaten out, and to contain, if in season, the insect, either in the larval or pupal condition. In fig. 29 the work of this tiny insect on the leaves is shown. The moth, chrysalis, and larvæ are all represented, but much magnified.

The larva, when full-grown, is about one-fifth of an inch long, of a pale brown colour, with a black head and a black patch on the upper part of the next segment. It is also sparingly covered with short, fine hairs. The change to a chrysalis takes place within the mined leaf, and in summer the moth escapes in about a fortnight.

The perfect insect, when its wings are spread, measures about three-eighths of an inch across; it is of a brownish-yellow colour, dotted with fuscous scales. The fore-wings are crossed by three white lines, as shown in the figure; the hind-wings are pale grey,

and both pairs are deeply-fringed. There are two or three broods of this insect during the year.

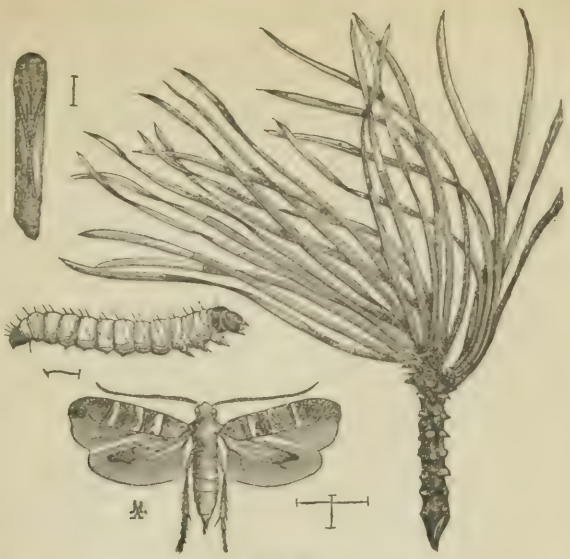


Fig. 29.

In addition to those enumerated, there are a score or two of species of insects which are known to devour the leaves of the pine, in some instances injuring them very much. Unfortunately it does not yet seem to be within the power of man to do much directly towards limiting the destructive work of these enemies to our forests, yet this should not deter us from studying their habits and life history, as a knowledge of these may help us much more than we anticipate. A few trees, such as a belt or group planted for shelter or ornament, may be protected from the leaf-destroyers by syringing them with a mixture of Paris green and water, in the proportion of a teaspoonful of the poison to a pailful of water. Bark lice may be killed by the use of alkaline washes applied with a brush or broom; such alkaline applications are also of use in preventing the borers from obtaining a lodgement in the trees, as these insects will not usually deposit their eggs on trees so protected; but it is scarcely possible that such remedies can ever be applied over extensive areas of forest. It is gratifying to know that in addition to the number devoured by insectivorous birds, almost every injurious species is preyed on by predaceous and parasitic insects, which seek out and destroy the pests with ceaseless diligence. Were it not for these friendly species, the destructive insects would long ere this have rendered the growth of trees an impossibility.

THE CHINCH BUG—*Micropus leucopterus.* Say.

By Wm. Saunders, London, Ont.

This formidable insect pest has recently appeared in force in the adjoining State of New York, where it has within a limited area inflicted a very considerable amount of damage. That an insect so enormously destructive as this one is in the west, has domiciled itself so near us is sufficient to excite some alarm and induce our agriculturists to be on the alert and to use such defensive measures, in case of attack, as the science of economic entomology has suggested.

During the last week in September a package of insects was forwarded to the New York State Entomologist, with the following statement in regard to them, from Mr. M. H. Smith, of Redwood, Jefferson county, N.Y.: "I herewith transmit specimens of (to us)

a new and formidable grass-destroying insect, together with portions of grass destroyed by them, and also some of the soil, for the purpose of examination. If the insect is known to you, and there is any known way to exterminate it, please inform us at once. The evidence of its destructive work was first discovered in June of 1882, by Mr. H. C. King, of Hammond, St. Lawrence county. At haying time, about the middle of July, he noticed about three acres of his timothy grass to be apparently prematurely ripened. In the fall he observed that there was no aftergrowth, and that the stubble was as dead as if it had been boiled. Search was made among the dead roots without any discovery. The following spring the field was entirely barren of timothy, but some clover seeds and thistles occupied the ground where at least one and one-half tons of timothy to the acre, under favourable circumstances, would have been cut. In June of 1883, Mr. King discovered other fields to be affected in the same manner, and instituted a search which has recently resulted in the discovery of myriads of the insect, not in the dead grass, but at the edge of the live grass, where they may be scraped up by handfuls. They have destroyed about fifteen acres for Mr. King, and several acres for each of several other farmers of his vicinity. They are causing extreme alarm, and if you can give any relief from this calamity it will be gratefully appreciated. This is an important grazing locality. In addition to the timothy, June grass and wire grass are also destroyed."

On examination this insect proved to be the notorious chinch-bug, a pest hitherto extremely rare in New York State, and never before recorded as destructive within that State. Prof. Lintner at once visited the district referred to, and thus records his personal observations made during the 5th and 6th of October. He says: "The cold weather of the past few days (ice was formed upon three nights), has doubtless driven most of the bugs to their winter quarters for hibernation, in crevices, beneath boards, rails, etc., in rubbish heaps, and to many other secure retreats, where such insects are accustomed to hide. Yet, upon parting the roots of the timothy, upon the borders of the killed portion, they were found in alarming numbers—in some spots sufficient to cover the ground with their bodies over an area of a couple of inches in diameter, being apparently congregated in such places. In one spot, upon the warm sloping side of a dead furrow, they could be seen, in numbers, running like ants over the ground. Elsewhere, they were concealed among the roots, near to and about the bulbs, upon which they appeared mainly to feed. Their presence in any spot could always be detected by bringing the nose near the ground by their peculiar bed-bug odour. This method of detection proved more convenient, and infallible than looking for them.

"The invasion is more extended than was at first supposed. Nearly all of the farms in the neighbourhood of Mr. King have been attacked, either last year or this, and discoveries of attack not before suspected, are, upon examination, being made daily. A present range of about eight miles is indicated. It is believed to occur throughout most of the town of Hammond, and to extend into Alexandria.

"Without any desire to play the role of an alarmist, I feel it my duty to say that, as the result of my observations, this chinch-bug invasion of northern New York threatens to be the most serious insect attack to which our State has ever been subjected. The following are my reasons for this belief:—

"It has planted itself, maintained a footing and has shown a rapid increase under unfavouring, unpropitious and unnatural conditions, such as these:

"First.—It is regarded as a southern insect (extending further northward, as do most animal forms, in the Mississippi valley), yet it has appeared in the most northern county of the State, and upon (if the report be reliable) the St. Lawrence river.

"Second.—Its attack has been made upon timothy. This seems to be its most unusual food plant, and therefore, we infer, the least suited to it. All previous accounts concur in giving it a preference for spring wheat above all things else; next in order, oats or corn, and last the grasses. Timothy is only mentioned as occasionally attacked by it.

"Third.—In all previous accounts, great prominence has been given to its being a hot and dry weather insect, dependent upon these conditions, not only for its multiplication, but for its existence. Heavy rains have been claimed to be invariably fatal to it. It could not abound, it is stated, in a wet season. Dr. Fitch had even made recommendation

of sprinkling it with water (an artificial shower), as the best means for its extermination. In the present instance, the bug obstinately persists in multiplying, contrary to all rule. The past year and the present have both been years of excessive rainfall in St. Lawrence county. Spring, summer and autumn have been exceptionally wet. In the spring, I am told that heavy and continued rains flooded meadows now showing the chinch-bug attack. At haying time, when the bugs were young, and, according to all the statements hitherto made, readily killed by wet, the rains were so frequent and severe, that the grass cut could only be secured with difficulty. Upon Mr. King's farm, much of it was drawn in, upon favourable days, by improving the opportunity of extending the labour into hours after nightfall. At the present time grass is lying in fields in stacks, which could not be gathered, owing to continued rain, and fields of oats are still unharvested."

This insect belongs to the order Hemiptera, which includes all true bugs. These are all furnished with a sharp proboscis or beak by which the substance they feed on is pierced and its juices extracted by suction. This piercer when the insect is at rest is bent beneath the body. The chinch-bug belongs to a sub-division of the hemiptera known as the half-wing bugs (Heteroptera), and to this same group the well-known bed pest belongs, and they both give off the same disagreeable odour when touched.

The accompanying figures will aid in making clear the life history of this species.

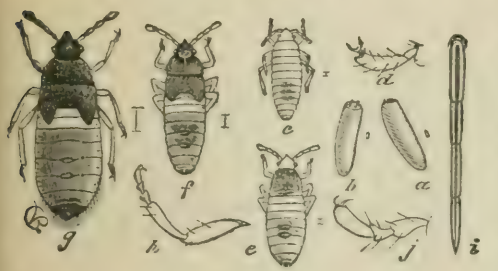


Fig. 30.

At *a* and *b* (Figure 30) the eggs are shown much magnified, the short lines at the side of all these figures indicate their natural size. These eggs are about one thirty-third of an inch long, of a long oval form with the top squarely cut off. When at first laid they are pale in colour and semi-transparent, but shortly they change to an amber shade and finally in part to red as they approach maturity. The newly hatched larva shown at *c* in the figure is pale yellow, with an orange-coloured patch on the abdomen; very soon the whole body becomes red, except the first two joints of the abdomen which remain yellowish. With the growth of the insect the red colour becomes quite bright and contrasts strongly with the pale band as shown at *e* and in a more marked manner at *f*. As the insect approaches full growth the head and thorax become dusky in colour, and the abdomen of a duller shade of red. At *g* the pupa is represented, in which stage the insect loses none of its activity but gradually becomes duller and darker in colour. At *h* one of the legs of the insect is shown enlarged and at *j* the tip of the same still more highly magnified, while at *i* the jointed proboscis or beak is represented.

In figure 31 we have a view of the perfect insect, also magnified, the short line behind it showing its natural size. It is about one-tenth of an inch long and about one-third of its length broad. In colour it is black, and when examined with a magnifying lens the body is seen to be slightly hairy. The wing covers, which lie flat upon its back, are white with black veins and a black spot on each side about the middle and towards the outer margin. The feet and the outer swollen joints of the antennæ are yellow, the legs and the basal joints of the antennæ black.

Fig. 31.

Its size seems to be quite out of proportion to its destructive powers, and minute though it be it nevertheless inflicts an almost incredible amount of injury in certain years upon the grain and corn crops. Prof. Lintner states that "In 1864, its injuries in the State of Illinois to wheat and corn alone were computed at seventy-three millions of dollars. This was a year of unusual excess, but it is not of rare occurrence that a State should suffer a loss of from twelve to fifteen millions of dollars in a single year. When the

insect abounds, it is so numerous as to cover the ground; it blackens the stalks of the plants upon which it feeds; it fills the air when, at seasons of its mating, it takes wing for flight; it marches to new feeding grounds in solid bodies, upon and over one another; its invading armies sweep over and utterly destroy a wheat or corn field in two or three days; and the nauseous bed-bug odour which they exhale sickens those who are compelled to breathe it.

"As the past history of the insect has shown that parasites and other enemies have entirely failed to arrest its multiplication, we are compelled to believe, from present indications, that it has come to stay, and that it will do so, unless effectual means are taken to prevent it. Its capability of increase is wonderful. Under the most conservative circumstances, a single chinch-bug, depositing its eggs about the 1st of June, would be, in the following August, the progenitor of a quarter of a million."

It is evidently most important that every practicable means should be employed in the endeavour to arrest as far as possible the progress of this mischievous foe, and to destroy it wherever found. Should it continue to increase, since it is already upon our borders, it will in all probability establish itself in force in the adjacent districts in Ontario, if indeed it has not done so already, and it may become to us a more formidable enemy than the wheat midge.

REMEDIES.

Where the insects are found among the roots of timothy, it is recommended to plough them under by turning over a flat (not overlapping) broad furrow as deep as possible, but not less than eight inches. It is said that the insect cannot survive this deep burial. Fire will certainly destroy it, and where the conditions of the grass will admit of burning, this measure should be resorted to; a thin covering of straw would prove a material aid in the burning. Where neither of these remedies can be applied the field should be heavily rolled as early in the spring as possible, for the purpose of preventing the bugs which have hibernated, from gaining easy access to the roots of the grass or grain on which to deposit their eggs. The use of common kerosine or coal oil has also been recommended, made into an emulsion by forcibly agitating it for a considerable time with an equal measure of milk, either sweet or sour, when it will become thick almost like butter, which, diluted with water, should be sprayed over the ground by means of a suitable pump; or the oil may be emulsified by agitating it thoroughly with a larger quantity of soapsuds and applied in the same manner.

OBSERVATIONS ON FORM AND COLOUR, AS EXHIBITED IN INSECTS.

By the Rev. Thomas W. Fyles, South Quebec.

The most careless observer can hardly have failed to notice some of the peculiarities in the motions of birds—the heavy flight of the heron, the short, quick strokes of the wild duck, the serene gliding motion of the hawk—and tracing backward, in a measure, the lines of causes and effects, to associate these with diversities of structure. But to those who are not careless—to those whom interest or pleasure has led to observe *attentively*, the movements of living creatures convey many a lesson. I once knew a man who had been brought up in a lonely cottage, on an extensive piece of common land—half moor, half fen—situated in the north-east of England. The spot was a favourite breeding-ground of numberless wild fowl—mallards, shovellers, grey geese, black-headed gulls, curlews, dottrells, red-shanks, etc. This man had made the study of natural history his delight, and turned his knowledge to account in procuring a livelihood. He made it a part of his business to supply plovers' eggs to the dealers; and so closely had he watched the green plover or lapwing that (as he assured me, and as my observations of his proceedings led me to believe), he could not only tell from her motions whether the

mother-bird had eggs or young ones, but whether, in the former case, she had laid a part only or the whole of her complement of eggs.

That peculiarities in the flight of insects, too, have arrested the eye of the *ordinary* observer may be gathered from the common names given to different species, such as the Hawk moth, the Humming-bird moth, the Owlet moth, the Vapourer, etc. But the scientist regards nature with a keener eye than does the ordinary observer; and what American entomologist does not recognize at a glance the dash of *Clisiocampa Americana*, or the loose-jointed shambling flight of *Ctenucha Latreilliana?* What naturalist does not readily distinguish between the steady, shrill clarion of the mosquito and the fussy, impertinent buzz of the cattle-fly (*Stomoxys calcitrans*)? The late Reverend Chancellor Bird, who was an accomplished entomologist, was one night heard groping for a match by a friend, who enquired if anything were the matter. "No," he said. "*Such a moth* (naming it) is in my room. I know it by its hum; and I want it for my collection." And, in all probability, many a sound we cannot hear, and many a motion we cannot see, and many a scent our organs of smell fail to distinguish, have their messages to numberless living things.

First, a few words on the general form and build of insects. And, to illustrate the subject, let us take that philosophical toy named after the smooth-sailing bird of prey, the Kite. The school-boy, to secure the balance of his kite, attends to the weight and the disposition of the wings and the tail, and to the proper adjustment of the martingale. Now, take for example any species of the genus *Papilio* (such as Papilio turnus, fig. 32). The weight of the body of the insect answers to the tension of the string upon the martingale; the backward stretch of the hind wings, with their appendages, answers to the tail in the kite; and the adjustability of the wings secures evenness of flight. A number of insects have, more or less, the form of the *Papilionidæ*. Amongst them are the showy Canadian moth, *Attacus luna* (fig. 33), and the Brazilian, *Eudemonia Streckeri*.

Another remarkable form of insects may be called the Bat-like. *Attacus cecropia* (fig. 34) is an example of this; and so closely do the motions of the moth resemble those

Fig. 32.

of the Vespertilio that, in the dusk of the evening, it requires the eye of a naturalist to distinguish between them. Many of our butterflies have more or less of this form.

A third is the Bird-like. In this, when the wings are expanded, the body projects beyond the lines of the wings. In some cases the abdomen is furnished with tufts, which serve, in a measure, the purposes of the tail in birds. For examples see *Amphion nessus* and *Sesia pelasgus*. To maintain the balance of insects of this form nature has many expedients. In the Diptera the absence of the under-wings, which, in other cases,

Fig. 33.

Fig. 34.

represent the curved lower sweep of the secondaries and tertials in the wings of birds, *halteres* or balancers are supplied. In the Strepsiptera the lower-wings are largely developed, and the fore-wings degenerate into balancers.

There is a departure from this third form, in which all the four wings are nearly of equal length, and diverge considerably, as in the Dragon flies, of which fig. 35 is an example, and Lace-winged flies.

Fig. 35.

Where unusual projections are met with in the fore-part of the body, they are counter-balanced by a proportionate extension or development of the abdomen. The large head and scythe-like mandibles of the Horned corydalis are balanced by its dank and elongated body. In a dried specimen of this insect the want of symmetry, occasioned by the contraction of the abdomen, at once strikes the eye. The antennæ of the longicorn beetles are thrown over the back in flight, and the ovipositor of *Pimpla lunator* streams behind. There are instances among the Hymenoptera in which the abdomen is provided with a foot-stalk, and, in this arrangement, the equilibrium of the insect is maintained without an inconvenient increase of weight.

Many beetles have what may be called the Tortoise-shape; and it will be found that, as a rule, these are sluggish in disposition, falling, when disturbed, inertly to the ground. They are, consequently, oftentimes in danger of being trodden under foot. But their form is admirably adapted to resist pressure; and an ox might tread one of them into the yielding sod without doing it an injury. The potato-beetle is a familiar instance of insects of this form, and so is the beautiful pie-bald beetle that frequents the silk-weed.

The water-beetles and bugs are admirably adapted to their environment. *Belostoma grandis* (fig. 36) is a wherry of the most approved form, having powerful sweeps with which it can urge its way through the water. It is also provided in its fore-legs with grapnels, with which it can hold itself against the force of the current. Insects of this form—and there are many of them—may well be described as the Boat-shaped.

Fig. 36.

We have already alluded to the fact that variations of structure in winged insects are associated with diversities of modes of flight. The ample-winged Attici have a flitting, uncertain flight; but the clean-cut, powerful wings of the Sphinges (see fig. 37) are admirably suited both for hovering over flowers and for making a sudden dash out of the way of harm. Insects that have wings of an intermediate size are those that have the most stately flight. *Danais Archippus*, for instance (fig. 38), sails through the air with a grace and dignity that are perfectly charming. And this creature, too, is capable of long-sustained effort. It is known to be migratory, and to pass in flocks from one district to another.

In the calm summer and autumn evenings how amusing it is to witness the sportive dances, in the beams of the falling sun, of Ephemera and Tipulæ. The long limbs of these insects retard a forward movement, but yield readily to an upward flight. The mere weight, however, of the appendages soon brings the creatures down when the force of the wing-stroke is abated. Renewed efforts, again and again, give an upward movement, and so the mazes of the airy dance are threaded.

Fig. 37.

Fig. 38.

The honey-bee has the most business-like flight of any insect I know. With what calm, set purpose it passes from flower to flower! With what direct and eager flight it makes its way—in the summer, to the flowering basswood or the patch of white clover; in the autumn, to the field of buckwheat! How steadily it bears its burden to the hive! What a threatening twang it sends forth when annoyed by an intruder upon its haunts!

Some insect-sounds are produced by special arrangements, as the notes of the Cicada, produced by organs in the sides, and those of the Acheta and Gryllus by friction of the stiff membraneous wings. But the various humming noises of insects are produced by alar vibrations more or less rapid. Everyone acquainted with the structure of a reed organ knows that the different notes are caused by vibratory tongues of different sizes, and of different degrees of weight and pliancy. The range of octaves of the grand insect scale has never been determined. It may be that the organs of the smallest Cecidomyia are sensitive to pulsations caused by the vibratory motions of the wings of its minute compeers.

To return to our illustration of the reed organ: Who is not acquainted with the jar caused by the intrusion of a filament or other obstacle upon the notes? Just such a jar is heard breaking in upon the sustained note of the humble-bee whenever the creature passes into the corolla of a flower. The regular vibrations are broken short and disturbed, and a harsh, discordant sound is the result.

If one with a well-cultivated ear for music wishes to become acquainted with insect sounds, let him, on a calm evening in the beginning of July, just as night is closing in, take his stand by an English honeysuckle, or a bed of perennial phlox, or amongst the

plants of *Asclepia Syriaca* by the roadside, and, if the season be a good one, he will hear a concert that will probably be new to him. The performers usually found taking part in such entertaintments in Canada are the Sphinges—*cinerea, kalmiæ, gordius, sordida, hyale*, with "stars" of lesser magnitude. As the creatures recede from and approach the auditor's stand-point, he will be able to mark very fine *diminuendo* and *crescendo* effects.

The wings of bees and other Hymenopterous insects are provided with catches, which unite them on either side of the insect, so that, while beating the air in flight, the two present but one resisting surface. Observing wings such as these, hooked together, clean cut, stoutly nerved, and free from scales and feathers, and comparing them with those of owlet moths, which are loose, ample, and heavy with scales, we can understand how it is that their vibrations produce a clear, musical note, which strikes the ear, whilst those of the latter fail to do so.

The subject of colour, as regards insects, presents an interesting field, in which comparatively few investigations have yet been made. Many unsolved problems meet the explorer at the very entrance. How is it, for instance, that the chlorophyll, in the pulp and juices of leaves, having passed through the digestive organs of a caterpillar with the nourishment that is assimilated to the substance of the creature, eventually develops into the gorgeous hues and brilliant metallic embellishments which so frequently adorn the imago? What physiologist or chemist will make this clear to our perception?

Attention has been drawn to the fact that the insects that feed on the silk-weed (*Asclepia Syriaca*) are generally coloured black and yellow or black and red. But who can tell us why it is that the chrysalis which succeeds the caterpillar of *Danais Archippus* is not of these hues, but of a delicate pale green?

That God has wonderfully ordered things, so that the colour of insects shall be a safeguard to them, is apparent to the most casual observer. Some instances of this providential care are more than usually interesting. The caterpillar of *Sphinx quadricornis* feeds upon the elm. The leaves of the elm, when slightly injured, have a tendency to curl up longitudinally, and the ribs of the leaf, which are prominent on the under side, become, in the curled portions, very conspicuous. The larva of *Sphinx quadricornis* is exactly the colour of the leaf, and has transverse markings that are the very counterparts of its ribs. This resemblance is remarkable enough, but there is a further development which is perfectly marvellous. As the season advances the curled portions of the elm leaves become sere and dead, and *S. quadricornis* also changes its colour, and takes a rusty brown hue.

There is a genus of insects called *Ennomos*, the various species of which are known in England as the "Thorns." We have in Canada a fine representative of the family in *Ennomos magnaria*. The insects appear in their perfect state late in the autumn—our own species (*E. magnaria*) appears in October. The interesting particular that I wish to mention is, that in colour they all resemble "the yellow leaf" that is characteristic of the season of their appearance.

The English peacock butterfly (*Vanessa Io*), the American polyphemus moth, and some others of the Lepidoptera, present in each instance, when displayed, the appearance of a mask. When disturbed, the insects have, moreover, the trick of closing and expanding their wings, which makes their *touch-me-not* grimness more striking. As the tiger has been known to turn tail at the sudden opening of an umbrella, so the troublesome child, or the busy titmouse would be likely to start back at the sudden presentation of the expanse of wing, with its eye-like spots and formidable markings. The flash of the metallic spots on the "fritillaries" and the changeful sheen of the purple emperor (*Apatura Iris*) may also act as deterents against attacks of predatory birds.

The pleasing contrasts and exquisite harmony of colouring that are met with, not only in the diurnal Lepidoptera, but in the night-flying species also, exemplify the truth that "the works of the Lord are great, sought out of all them that have pleasure therein." It is marvellous to find the most brilliant and attractive hues in insects that seldom, if ever, meet the eye of the ordinary observer. Indeed, many an insect fails to reveal its glories to the unassisted vision at any time. It is only through the microscope that the richness of its velvet dress, or the hyaline splendour of its gauzy wings is made apparent.

Among the pleasing contrasts in the colouring of insects the following are conspicuous :—

CONTRASTED COLOURS.

Black and white	*Melanippe hastata*
Black and yellow	*Papilio Turnus* (Turnus' butterfly).
Black and red	*Chrysophanus Americana* (small copper).
Black and orange	*Melitœa phaeton* (Baltimore fritillary).
Black and grey	*Catocala relicta.*
Black and Indian yellow	*Catocala subnata.*
Black and fuscous	*Danais Archippus.*
Grey and magenta	*Catocala concumbens.*
Grey and scarlet	*Catocala parta.*
Grey and crimson	*Catocala Briseis.*
Brown-madder and rose	*Philampelus Achemon.*
Buff and rose	*Dryocampa rubicunda.*

Then we have—

Blue-black barred with white	*Limenitis Arthemis.*
Black barred with red	*Cynthia Atalanta.*
Black barred with white	*Baptria albovittata.*
Black spotted with white	*Alypia Langtoni.*
Grey spotted with seal brown	*Harrisimemna trisignata.*
Rust red spotted with silver	*Calopistria monetifera.*
Fuscous washed with gold	*Plusia festucæ.*
Olive green washed with bronze	*Plusia balluca.*

We cannot rise from the survey of any portion of the insect world, having examined the wonderful fitness to its surroundings that every individual in it displays, the adjustment of parts in the perfect whole in every case, the strength and compactness and exquisite finish of the most minute organs in even the least attractive species, the harmony of colouring presented by some kinds, the gradation of tints or the brilliant contrasts by others, without feeling a measure of the admiration that filled the breast of the ancient king, when he looked round upon the works of God, and without catching an echo of his inspired utterance, "O Lord, how manifold are Thy works! In wisdom hast Thou made them all; the earth is full of Thy riches."

NOTES ON WORMS.

By James Fletcher, Ottawa, Ont.

It is probable that some naturalists, on taking up this report, may be not a little surprised at seeing "Notes on Worms" as the title of a paper in an entomological report. Judging, however, from my own correspondence and the number of applications which, as a member of our Society, I have received for information on these interesting creatures, I am of the opinion that a large proportion of those for whom these reports are chiefly written will be considerably more surprised than these savants when they are informed that earth-worms do not legitimately come within the limits of an entomologist's studies. It must be borne in mind that our annual Report is prepared principally for the benefit of the farmer, the fruit grower, and the horticulturist; and it is in recognition of this fact that it is always bound up together with the report of the Fruit Growers' Association of Ontario. As only a small number, comparatively, of those engaged in these pursuits are scientific entomologists, the papers are all written in as popular a manner as possible, and with as many scientific names and phrases omitted as accuracy will allow.

It is a source of considerable gratification to the Council to notice that the demand for information from this important class of the community concerning insects injurious to crops or to stock is daily on the increase. Special arrangements have been made by which, during the coming season, those engaged in cultivating the soil will be encouraged not only to make use of the Society as a source of reference, but also to take systematic notes, under instructions to be sent out by the Council in the spring, of their own observations made on any insect pests occurring in their neighbourhood. It is hoped by this means to elicit much valuable information, and also, at the same time, to increase the number of practical entomologists among those to whom, more than anyone else, a knowledge of the science is most essential.

In these "Notes on Worms" no account will be found of the multifarious pests regarding which, under the name of "*a* worm," information is often asked of an entomologist from a beetle, an aphis, a mite, a centipede, an iulus, or a gordius, to larvæ of every description; nor either of that mysterious creature at whose door as "*the* worm" so much harm is laid when the cause is not apparent or is not understood. I shall confine myself to a consideration of that lowly, and, for want of better knowledge, much despised member of the animal kingdom, the Earthworm, and shall endeavour to secure for it a greater amount of consideration, by bringing forward some of the more interesting points in its history, gleaned from all the published accounts I could find on the subject, as well as from observations made by myself on individuals kept in my study. Worms may, at first thought, seem to be strange pets, but to anyone who will take the trouble to secure a good sized worm and place it in a large, clear glass jar partially filled with damp earth, there are so many interesting and instructive experiments which can be made, that any trouble taken will be much more than repaid. I have now before me an enormous specimen, which I have had thus housed for some months; when fully extended it measures nearly eighteen inches. From its large size it is, of course, much more easily examined than smaller specimens.

Worms "are by most people regarded as rather ugly, but harmless, wriggling things, slimy and disagreeable to touch, unsightly to look at, and about as destitute of interest as anything that lives, and moves, and has an independent existence. But all this is founded on a false estimate, and the false estimate is, as usual, founded on ignorance. The worm may almost be called a clever and intelligent creature; very shy indeed of letting its mode of action be seen, but showing by certain results, which readily come under our observation, that it has instincts which fall very little short of reasoning and design."—*Prof. Paley, Science Gossip, 1878, p. 121.*

"The idea of a worm of any kind is unpleasant to the refined taste, but there is nothing especially repugnant in the appearance of the earthworm. When a young lady, however, upturns one as she digs her flower bed, ten chances to one she will scream and run away, and dig no more that day; but, at the sight of it, her youthful brother has a beatific vision of a boat and a river, the bobbing of a cork, a struggle, the splashing of a broad tail in a leaky skiff; and the man with the microscope, as he passes by, takes it tenderly in the palm of his hand, and carries it into the house. Let us go in with him and see if he can find any item of interest in the anatomy of this humble dweller in the earth."—*Dr. A. C. Stokes, in Field and Forest*, III, p. 124.

Before passing on to the structure, or to the important work earthworms perform in the economy of nature, it may not be amiss to indicate the position these creatures hold in the animal kingdom.

From the historical introduction to a valuable report made to the British Association in 1851, by Dr. Thomas Williams, it would appear that this has been a point of considerable difficulty for naturalists to determine. Among the ancients the terms *Vermes* (a word conjugate with *certo* = to turn) and σκώληξ were used to denote, generally, all lower animals resembling in form the leech and the earthworm; this acceptation of the words prevailed down to the time of Lamarck. "The true zoological limits of the Annelida were only confusedly determined by the observers of nature, antecedently to the time of Pallas (1766). To the sagacity and industry of this naturalist, science is indebted for the first clear definition of the boundaries of this class" (p. 161). "Blumenbach it was who first observed that true worms are in no instance distinguished by the

possession of articulated organs of motion, a negative character in which they are separated from all insects and crustacea."

In 1798 Cuvier divided the *Vermes* of Linné into two leading groups—*Chætopoda*, in which spines are present, and *Apoda*, in which they are absent. Even at this period he saw, though only with dim insight, the necessity of separating the entozoa from the true worms. In 1802 he read a paper before the "Institut," in which he first proposed to designate the *Chætopoda* under the phrase *red-blooded worms*, adding to it the leeches and earthworms. "It was about this time that M. de Lamarck defined with increasing clearness the line indicated by Cuvier which divided the *Chætopoda* from the *Intestina*. A new era in the history of the Annelida was now about to occur, for it was in the year 1812 that the class name *Annelides* sprang from the fertile and inventive fancy of M. de Lamarck. By this denomination, through various mutations, the worm tribe has ever since been known among naturalists." (P. 162).

The class ANNELIDA, of Lamarck, as now constituted, is composed of a series of animals which form only a portion of the heterogeneous class *Vermes* of Linné, which, in addition to those now understood, included also intestinal worms, mollusks, zoophytes, and sponges. Lamarck's *Annelida* are distinguished from all other worms by the possession of red or coloured blood, for which reason they are sometimes called by the name of Red worms. Cuvier considered this characteristic one of great importance. In his last edition of "Regne Animal" he arranged them under the *Articulata*, and on account of their red blood gave them the chief position, but they are now generally classified as a separate type below the latter; their general appearance seems to point them out as the representatives of the larval rather than the perfect state of insects, and thus to indicate their proper position to be below both *Insecta* and *Crustacea*. There is no doubt that a great many species have been confounded under the name of *Lumbricus terrestris*, L., which is the name of a common European species, and it is most probable that we have in Canada distinct species differing from those found in Europe. I do not know of any treatise which describes any of the North American species; but since I have turned my attention to them I have noticed at least four very distinct forms besides one specimen which upon being taken roughly in the fingers was distinctly and beautifully phosphorescent. It is evident, however, that, with the constant interchange of fruit trees and other plants, growing in pots and otherwise, between North America, Europe, and other parts of the world, the transportation of a species from one part of the world to another would be an exceedingly easy matter, and a small number of species in this way might be distributed over a large area. "However, in 1868, Vaillant had recognized in the several groups of the Oligochæta (ὀλίγος = few, and χαίτη = a bristle), the order in which *lumbricus* finds its place, no less than twenty-five genera, including quite a large number of species from various parts of the world, which are represented in nearly all regions of the globe, and which he divides into two families, distinguished by the distribution of the setæ. (1) *Lumbricidæ*, with simple setæ, including the earthworms; and (2) *Naidæ*, with bifid, or hair-like setæ, embracing the fresh water species. These families are again each divided into two sub-families, the former into *Lumbricidæ*, *Lumbricinæ*, where the setæ are isolated or grouped two by two, and *Lumbricidæ*, *Enchytræinæ*, where they are three or four in number in bundles. The Naidæ, in *Naidæ*, *Nainæ*, have the setæ in four rows (exceptionally biserial,) and then all hair-like; and in Naidæ, Chætogastrina, they are biserial but never hair-like.—*Theodore Gill, in Johnson's Cyclopædia of Universal Knowledge.*

The latest system of classification is, I believe, that of Claus who divides the Oligochæta into Terricolæ, or terrestial forms and Limicolæ or aquatic.

The structure of the body of the earthworm is very simple. In a large specimen it consists of from 100 to 200 segments closely approximated to each other. The first segment is elongated and proboscidi-form, and beneath there is what generally appears to be a small depression, but which, when the worm is feeding, is seen to be a very capacious mouth. The elongated first segment is the upper lip, and is used as an organ of prehension, by means of it the worm is able to take hold of any objects which it wants to take to its burrow, and if watched by means of a lamp at night, for they are almost entirely nocturnal in their habits, they may frequently be seen collecting any small objects which

happen to lie near their burrows. They have three distinct methods of conveying objects to their holes. That usually resorted to, at any rate by those in confinement, is to suck into their mouths a portion of the object and then draw back by contracting the muscles of the body; another mode is to take hold of the edge of such objects as leaves or pieces of paper by folding the upper lip over the edge and holding it between the two lips; the other way is perhaps the most remarkable, and consists of pressing the mouth tightly against smooth objects, such as small stones embedded in a gravel walk, or even of a flat leaf occasionally; then by drawing back the pharynx a vacuum is created and the object is withdrawn with great force, on exactly the same principle as the toy made by schoolboys of a small piece of wet leather with a piece of string through the centre, and which, when trodden down evenly and tightly around the edges on a flat even stone will raise a very great weight. Occasionally, too, no doubt small pieces of leaves and other small objects are drawn back to their holes by sticking to the mucous covering of their bodies. After the first segment the body rapidly increases in size until it reaches the average dimension; but in a full grown worm, particularly at the season of reproduction, when it becomes a highly important organ "a part of the body, into which more or fewer of the segments, (according to the species) between the twenty-fourth and thirty-sixth inclusively, enter, is swollen, of a different colour from the rest, provided with abundant cutaneous glands, and receives the name of the *Cingulum* or *Clitellum*." This singular organ has sometimes given rise to the erroneous opinion that if worms were accidentally cut in two the two parts would come together again and join, or that the two portions would live, the head end forming a tail, and the tail end growing a new head. The absurdity of these views is however apparent when it is remembered that the nervous system consists of two cerebral ganglia or nerve centres, both of which are placed in the anterior end of the animal, they are lodged in the third segment, and are connected with the double chained nervous cord which extends through the whole length of the body beneath the intestine. The circulatory system consists essentially of a dorsal trunk situated, over the intestine, which carries the blood from behind forward, and a ventral or sub-intestinal one conveying the fluid in the opposite direction. The blood is red but has no corpuscles, and is quite different from that of vertebrates. The circulation may be easily observed. If a small worm is taken out of the ground for a short time and kept in water, it will void the earthy contents of its body, and will become sufficiently transparent to show the circulation, if slightly compressed between two slips of glass and examined with an ordinary magnifying glass.

The Oligochæta are hermaphrodite, the two sexes being united in the same individual, but two individuals pair together, the sexual elements are developed in certain anterior segments.

Earthworms do not possess any special respiratory organs, but breathe principally by the skin and partly by the vascular system on the walls of the intestine.

In vol. III. of *Field and Forest* (1877) there is an elaborate description of the muscular system of *Lumbricus*, written by Dr. A. C. Stokes. This article is of great value, as it is a record of extensive and careful original observations. At page 138 we find: "Down the back of the creature in the middle line, one in each intersegmental ring, is a row of circular openings. On the inner surface of each segment, therefore, below the longitudinal muscle, is a muscle parallel with the length of the worm, and extending from the lower edge of the orifice above to the upper edge of the aperture below. The two ends are thickened vertically and slightly broadened, whence they gradually narrow toward the centre. What the use of these openings may be it is impossible to conjecture. They seem to have no connection with any of the internal organs, but to form a direct communication between the external air and the general cavity. The function of the muscles is evident. By their contraction they must widen the orifices, naturally found closed and invisible until pulled open by needles on the stage of the microscope, in imitation of the muscular action."

I must confess that I have been unable to detect these orifices; but as they are mentioned by other observers, this must have been owing either to want of skill on my part or to imperfections in my instrument. Is it not possible that these orifices may act as reservoirs for air, and that it is owing to their presence that earthworms can exist for

such a long time beneath water? We know that aquatic insects carry down a supply of air imprisoned by means of hairs beneath their elytra.

The muscular system is strongly developed. Worms can crawl backwards almost as well as forwards. When extended over the ground they can shoot back again beneath the surface with surprising quickness by the aid of their bristles and their tails which they flatten out to take firm hold of the walls of their burrows. The force required to dislodge them is great, and the only way to manage without breaking them in pieces is to copy the tactics of the blackbirds and thrushes, who take a firm hold and then keep up a steady pull until the worm lets go, which it will soon do, if the strain is kept up. This resistance is also greatly sustained by the setæ or bristles with which the body of the earthworm is provided, they run in four double rows, two lateral and two inferior, for the whole length of the worm's body. These setæ are doubtless of great assistance to worms and act in the same capacity as feet, they are shaped like the italic letter *f*. Dr. A. C. Stokes says at p. 128, "If, with a strong pocket lens, we look directly down upon the sides and ventral surface, there are visible, projecting from almost circular openings in the skin, and pointing backward, eight lines of glistening bristles, beginning at the very first segment, (considering the first segment to be the one immediately behind the two lips) and extending in unbroken order to the very last. These setæ are arranged in pairs forming four continuous rows, of four sets and eight bristles to every segment. In the central and terminal rings they are frequently accompanied by several aciculi, at times short, broad, and sharp, at others long and narrow. The worm has not only the power to project them from their proper openings, but to entirely withdraw them into the cavity of the body.

"Contained, as each seta appears to be, in a sheath, structureless and apparently identical in character with the skin, it is an object of interest, but when isolated it becomes a thing of beauty. The free end is roughened by friction against the earth, it is translucent, and its general outlines are of the most graceful form. I suppose when Hogarth drew his celebrated line of beauty, the thing most remote from his thoughts was an earthworm, but if he had prepared a line with the curves of all earthworm's bristle and named it the line of beauty, the difference between it and his original creation would have been slight. There is nothing new under the sun, the wise man said, the very line of beauty was hidden in an earthworm's skin when the great artist's pencil was making an unsuspected copy. These bristles, at every step, enable the worm to put into practical use one of the first principles of mechanics—that of the lever; for not only do they, by the aid of special muscles, hold the distance gained by muscular contraction, but also help by prying the body forward." There are two pairs beneath each segment and each one has an appropriate system of muscles attached to it. Dr. Williams states they are so sharp that if the polished surface of a deal board be examined with a microscope after a worm has crawled over it, there will be plainly discernable four series of minute perforations. In the act of burrowing, the anterior setæ are firmly placed in the ground, the head is then drawn back, and the strong pharynx, which is placed internally just behind the mouth, is pushed forward with great force; at the same time a new wave of muscular action starts from the tail and gradually travels towards the head, so that the whole muscular system is brought into play in making a burrow.

The body is divided into as many chambers as there are segments, by muscular partitions, which have openings to allow the fluid contents of the general cavity to pass from one chamber to another. By special preparation the body of a worm can be hardened so that a section may be cut from the middle, and if skilfully done, the sides will not collapse, nor will the disposition and shape of the internal organs be disarranged. If this is placed under the microscope, it will be seen first of all that the body is contained by a skin made up of two layers, through which protrude the four pairs of setæ. Outside is a thin and transparent chitinous cuticle, and inside this a much thicker gelatinous layer called the hypodermis. Internal to this lies a thick layer of circular muscles, the rings of which go quite round the body; inside of this layer we find a much thicker coat of muscular fibres of two sorts, but both running longitudinally, one kind composed of thin bands placed vertically to the circular row just mentioned, and the other of fibres running transversely to them. Inside this is the general body cavity, through the centre

of which the intestine passes. This latter has first a glandular greenish yellow layer, which above is laterally produced into the lobes of the liver, and which are separated by the dorsal canal of the water vascular system. Inside the greenish yellow layer come successively a longitudinal and circular layer of muscles, and then inside these another glandular layer covered internally by thin cells. This has brought us to the cavity of the intestine, which is simply a tube running from the mouth to the end of the body, but it is peculiarly formed, having almost the appearance of a tube within a tube. This arises from the fact that the tube of the intestine is much larger than the space it has to occupy. The only way then it can be contained is by having the upper wall folded into a sort of loop inside the canal. This is hard to explain, but can be easily understood if the two ends of a piece of string about a yard long are tied together so as to make a large ring. Now let anyone take hold of this ring with the hands about a foot apart, and then bring their hands together so as almost to meet, when a small ring will drop down inside the larger ring. This will give just the shape of a worm's intestine. This curious fold is called the *typhlosole*. I have mentioned that between the two lobes of the liver and directly beneath the middle of the back and above the intestine is the dorsal canal of the water vascular system. Just beneath the intestine in one section will be seen four circular marks, ∴; the top and bottom ones of these are the canals of the water vascular system, and the pair in the middle are the double chained nervous cord.

The simple digestive system or intestinal canal, which is in the form of a more or less muscular tube, is divided into a strong pharynx, which is pushed forward when the animal is forcing its head like an awl between the particles of loose soil, or drawn back either when it is used as a sucker to draw in food or when the mouth is used to draw heavy or smooth objects towards the burrow. This pharynx is analogous to the protrusible proboscis which is found among some Annelids (Eunicidæ, Lycidicæ, Nereidæ). The pharynx leads into the œsophagus, which bears on each side of the lower part three large calciferous glands. In most species there is a crop in front of the gizzard. This latter organ is surrounded by a double set of very powerful muscles. Grains of sand and small stones from one-twentieth to a little more than one-tenth of an inch in diameter may be found in the gizzard and intestines, and are supposed to serve like millstones to triturate the food. The gizzard opens into the intestine. The calciferous glands are very remarkable, for nothing like them is known in any other animal. Their use is largely a matter of speculation, and Darwin in his recent work, "The Formation of Vegetable Mould through the action of Earthworms," says of them: "Almost as many theories have been advanced on their use as there have been observers." The author of the above-mentioned work has, in it, collected together and himself verified almost all the facts which have been recorded concerning earthworms by previous observers. The results of his studies, too, are most reliable, from his character of scientific candour. He never neglected, in the discussion of any subject, to examine all sides of the question, and to weigh carefully all opinions, whether adverse to his own views or not. This work is the result of continued and persevering study for a space of nearly fifty years. I shall to a large extent use his words in this history of the work worms perform.

With regard to the calciferous glands, he thinks that they serve primarily as organs of excretion; and secondarily as aids to digestion. The food of worms consists of organic matter in a state of decay. This they either obtain from the soil, which they swallow in large quantities, both when they are excavating their burrows, but also for food, or else direct from the leaves of plants, which they drag into their holes.

He says, p. 49, "Worms consume many fallen leaves; and it is known that lime goes on accumulating in leaves until they drop off the parent plant, instead of being reabsorbed into the stem or roots, like various other organic and inorganic substances. The ashes of a leaf of an acacia have been known to contain as much as seventy-two per cent. of lime, worms therefore would be liable to become charged with this earth unless there were some special means for its excretion; and the calciferous glands are well adapted for this purpose." When these glands have excreted, a certain amount of lime it is expelled into the alimentary canal; from the four posterior glands in the shape of minute cells, and from the two anterior in the shape of large concretions. It is supposed that the carbonate of lime so formed aids materially the process of digestion by neutralizing

the acids which are always generated during the decay of vegetable substances, whether in the intestines of animals or on the ground; and in this case it is probable that concretions of lime are formed by some of the glands, so that they may be carried down to the posterior parts of the intestine before they are dissolved. Claparède thought that these hard bodies were formed to act as millstones, and thus aid in the trituration of the food; but as worms swallow many small stones, which may generally be found in their gizzards, Darwin's theory is the more probable.

Worms have no eyes, but yet are able to appreciate light by means of their nervous system through their skins. If a strong light is turned on them suddenly they will sometimes dart back into their holes with great quickness. This is not always the case, however, for if the anterior portion of the body is shaded, an intense light may be thrown on the rest of the body without any notice being taken. A moderate light is after some time generally observed by them, and they will retire to their holes slowly and apparently hesitatingly. Darwin found that the colour of light made no difference in their appreciation of it, and that a moderate radiant heat, such as that from a hot poker being held near them, did not cause them so much emotion as a bright light. Worms being nocturnal in their habits, an appreciation of the difference between day and night is, of course, useful to them, and this they possess. The sensitiveness to light is less when a worm is engaged in eating or in dragging leaves into its burrow—a fact which Mr. Darwin is disposed to consider analogous to what in higher animals we know as the distracting influence of attention. It is a curious fact that worms kept in confinement keep quiet during the day, and only crawl about and work at night.

Although worms are deprived of vision and have no sense of hearing, their sense of touch is most highly developed. In observing them the greatest care must be taken not to jar the table or touch the jar in which they are, nor even to breathe on them, or they will instantly retire to their holes. In watching them out of doors it is necessary to tread very lightly or very little will be seen of their habits. A heavy footfall is sufficient to send home all the worms for many yards around. This is doubtless the reason why most of the birds which feed on worms are able to run and walk as well as hop.

With regard to the sense of smell Mr. Darwin arrived at the interesting conclusion that it was very feebly developed, and only at all for certain natural objects which were suited for food. Pieces of cabbage, onions, the leaves of parsnips, celery and many other plants were placed on the pots, and certain ones were always chosen and others left. Worms appear to be omnivorous, bits of meat and fat were always taken and eaten as well as enormous quantities of earth, out of which they extract any digestible matter, they will eat sugar, liquorice and almost any other substances which are given them. They are even cannibals, for they will eat the bodies of dead worms if they find them lying near their burrows. It would appear that the leaves which they draw into their holes are smeared with a fluid which is alkaline, and which acts on the starch and other contents of the plant cells and very much hastens their decay, "it thus resembles in nature the pancreatic secretion, and serves partly to digest the leaves before they are taken into the alimentary canal — so constituting the only case of extra-stomachal digestion hitherto recorded in an animal." In this way worms do good service by quickly decomposing the dead leaves and mixing them with the soil, nor is this the only way in which the surface soil is improved by these insignificant creatures, for Mr. Darwin has shown by most careful experiments that what gardeners complain of so bitterly, that the worms spoil the appearance of their carefully cut lawns by raising up all over them the unsightly mounds which we call worm-casts, they are of very great importance to the agriculturist. For not only do worms, by sinking their burrows deep into the earth, render it permeable by air and water, and so bring about its disintegration; but they are most powerful and active agents in adding depth to the soil and in covering up comparatively barren tracts with a layer of rich vegetable mould. Mr. Darwin began his investigations by remarking two most striking characters possessed by vegetable mould. These were, that it was of nearly a homogeneous nature throughout, although overlying different kinds of subsoil, and the uniform fineness of the particles. This is easily seen in a gravelly country where in ploughed fields there are many stones visible, while in an adjacent pasture there will be no stones within some inches of the

surface. Now this is entirely due to earthworms, as the following will clearly show. In a great number of instances it was found that certain materials had at different times been spread over the surface of pastures, and that after a few years they all disappeared, or as people were used to say "sunk into the ground." But it was found that they sank uniformly over the whole surface of the fields, and that this was not due to specific gravity was plainly seen from the fact that light cinders and small bodies sank at exactly the same rate as large and heavy stones. Moreover, added to this it was found that if all the worm casts were collected for the space of one year from one acre of good pasture land and were then dried thoroughly so as to be as light as possible, there were no less than the enormous amount of ten tons of earth annually thrown up by earthworms. And even these figures are not surprising to anyone who will carefully watch a small area of damp pasture land for a certain time, and notice the large quantities of earth thrown up. There are in different parts of the world worms of enormous size which throw up a proportional amount of prepared mould. One found in the Nilgiri hills, in south India occasionally throws up a tower, which when dried weighs a quarter of a pound. It must not be forgotten either that the earth of worm-casts is of the same nature as earth with a large proportion of decayed vegetable matter mixed with it; because the acids which form when leaves decay are formed much more quickly inside the worm, and are to a certain extent modified by the alkaline secretions of the worm's body. These humus-acids, too, have a decided effect in decomposing the small particles of rock and other hard mineral matters which are too small to be acted upon by the usual mechanical action of water, but which are swallowed by worms in large quantities.

Worms have effected what must to all seem cyclopean tasks, they have slowly undermined large stones, old pavements, low walls and even ancient cities, these little by little, as centuries have rolled by, have kept gradually subsiding until at last they have disappeared out of sight. The action of worms is not always perceptible where it occurs, for when castings are thrown upon the sides of hills they are liable to be washed down into the valleys by rain, or to be blown away in the shape of dust, when they have dried and became pulverized.

The burrows of worms do not often penetrate deep into the earth, but in winter and very hot weather they occasionally descend as deep as six feet from the surface. Worms must always have a large amount of moisture in the soil, and in fact so much is this the case that they may be called semi-aquatic. Perries kept a specimen entirely immersed for nearly four months, and the castings are always extruded in a semi-liquid state. The habit of lining their burrows with finely triturated earth, small stones and leaves, is thought by Dr. Darwin to be as a protection for their bodies against the cold of the earth; and for this reason they probably plug up their holes with small heaps of stones or leaves, pieces of string, feathers, and any other small objects which are not all certainly dragged in as food. Besides, by these tunnels materially helping the drainage of land and ventilating the ground, passages lined with fertile soil are opened for the roots of plants to descend, and also seeds are taken down by worms, and thus preserved for a long time to germinate and continue a species perhaps hundreds of years afterwards; and who can say that this is not the case, for do we not see plants spring up after forests have been cleared, where certainly the trees were hundreds of years old, and where these plants had not been able to grow from the time the country gradually turned by the increased growth of trees from a clearing into a forest. In this instance worms would prevent the germination of seeds, but sometimes they facilitate it by heaping their castings over small seeds and partially dragging large ones down their burrows.

I was much interested in seeing one of my worms dragging a small tuber of *Nymphæa tuberosa* down into the mouth of its hole, and it was curious to see that at first it was drawn across the pot by the air-tight sucker method, but when it would not fit conformably on the hole it was left alone for some time, and when a few hours later I looked at it, it had been turned half round and the neck was dragged down the hole which was thus tightly closed. I cannot finish this account of the working of these interesting creatures better than by giving part of the concluding paragraph of Dr. Darwin's important work.

"When we behold a wide turf-covered expanse, we should remember that its smooth-

ness, on which so much of its beauty depends, is mainly due to all the inequalities having been slowly levelled by worms. It is a marvellous reflection that the whole of the superficial mould over any such expanse has passed, and will again pass, every few years through the bodies of worms. The plough is one of the most ancient and most valuable of man's inventions; but long before he existed the land was in fact regularly ploughed by earthworms. It may be doubted whether there are many other animals which have played so important a part in the history of the world as have these lowly organized creatures." The truth of this must be patent to all thoughtful observers, and when the work of these animals is considered together with that of those industrious little insects, the ants, (which it is perhaps just possible Dr. Darwin did not quite consider enough in the estimation of the work of the transversion of the surface soil,) the results are simply startling.

Just as I am finishing this off I have had my attention called to a short note in Cassell's Magazine for December, 1883, p. 63, in which earthworms appear in a new and unexpected role. It reads as follows: "It has been found by M. Pasteur that the bodies of cows and sheep which died of contagious diseases, when buried in the ground may yield germs of the disorder which are brought to the surface by worms." This is worthy of careful consideration. It is easy to understand how this might be, for these minute germs would also easily rise themselves to the surface through the tunnels of worms, even if the worms did not actually bring them there.

The paragraph gives the following advice which it would be well for us all to make a note of: "A more efficacious and economical mode of dealing with such carcasses has been proposed by a French chemist. It is to dissolve the entire carcase in sulphuric acid, and then treat the resulting solution by chemical means for the recovery of salts, which can be used in manure. The plan has been tried with great success at a 'usine' in France, and the profit realized on every dead sheep treated was four francs."

BOOK NOTICES.

Catalogue of British Coleoptera, by Rev. W. W. Fowler, M.A., and Rev. A. Matthews, M.A. London: West, Newman & Co.

This Catalogue differs in some respects from all preceding lists of British Coleoptera. It is, namely, a partial adaptation of the American views by completely separating the Rhynchophora and Heteromera from the remaining series of the order, and the placing of them after the other series. The changes suggested in the relations of the families of normal Coleoptera, in the system of Drs. Horn and LeConte, are not yet in full favour with the conservative students of Great Britain, but may in future win approval as they become better known.

The American system, as it may be briefly termed, is fully set forth in the revised "Classification of the Coleoptera of North America," just published by the Smithsonian Institution. A notice of this work appears below.

The innovations of the system consist in a rearrangement of the bulk of the families into four sets; Adephaga, with the most perfected exo-skeleton and powers of locomotion; Lamellicornia, with the greatest visceral and nervous concentration, and highest development of sense organs; pseudo-tetramera; the remainder constitutes a vast complex of Clavicorn and Serricorn families, which may be divided into several ill-defined sub-series.

Classification of the Coleoptera of North America; by John L. LeConte and George H. Horn. Prepared for the Smithsonian Institution, Washington, 1883. Crown 8vo., 605 pages.

The Entomologists of America are placed under renewed and deep obligations to Drs. LeConte and Horn for this new edition of the classification of the Coleoptera.

More than twenty years have passed since the last edition was issued, and during that time no branch of natural science has made more substantial and rapid progress than this department of entomology. The number of zealous workers in the field has greatly increased, and the accumulated stores of collectors have been subjected to close examination and critical study, chiefly by the distinguished authors of this work, and the results have added to our list of genera and largely to our list of species, which now includes more than 11,000 in all.

In the introduction the external organization of the Coleoptera is fully treated of, aided by illustrations and followed by a useful series of tables of the various orders. The whole of the classification has been revised and brought into harmony with the present advanced condition of knowledge on this subject. The work is very complete and bears evidence of the vast amount of labour and erudition bestowed on it. Collectors everywhere will find it a most valuable guide in their studies and in the arrangement of their collections.

The Pine Moth of Nantucket, *Retinia frustrana*; by Samuel H. Scudder. Crown 8vo., 24 pages, with one coloured plate. Published by the Massachusetts Society for the Promotion of Agriculture, 1883.

We tender the author our sincere thanks for this excellent paper, containing the life history of this new enemy to pine trees, to which is appended a brief account of other native species of *Retinia*. The pamphlet is well gotten up, and the coloured plate a chromolithograph, beautifully executed. It represents the insect in its various stages along with the tips of the injured branches.

Report of the Commissioner of Agriculture, of Washington, for 1881 and 1882; 8vo.

We have been favoured with a copy of the full report by the Commissioner, and have also received separate reports from the Entomologists, Prof. C. V. Riley and Prof. J. H. Comstock. The full report forms a large octavo volume of 703 pages, and is illustrated with a number of plates and diagrams. The report of the Botanist on grasses suitable for Texas, has twenty-five plates: that of the Veterinary division on Swine Plague, Fowl Cholera, and Southern Cattle Fever, twelve plates. The report of the Chemist contains the results of an extended series of experiments on varieties of sorghum and maize, with results of the analysis of the constituents of these plants at different periods of their growth, particularly in reference to the available sugar contained in them. This valuable section of the work is illustrated by twenty-one plates, and contains also much other useful matter in reference to analysis of soils, fertilizers, etc. There is also a report from the Superintendent of Grounds, in which he gives the good results of mulching the ground with refuse tobacco stems, as a remedy for thrips on foreign grape vines grown under glass, and submits notes on a number of tropical and sub-tropical plants, some of which might probably be cultivated with success in southern California or southern Florida.

That part of the report devoted to Entomology is extremely interesting, and contains much that is valuable; it occupies 154 pages and is illustrated by twenty plates. The chief subjects treated of in Prof. Riley's portion are Silk-culture in the United States: Pyrethrum, its history and cultivation: the Army Worm, Scale Insects of the Orange, including the results of experiments with emulsion of kerosene oil for their destruction: Insects affecting the Rice Plant: Corn Insects, the Cotton Worm, Clover Insects. In that part contributed by Prof. Comstock we find a very complete history of the Apple Maggot: also of some allied species of Drosophila; a chapter on Lady-birds, and another on Lac Insects, all illustrated by excellent plates drawn by Mrs. Comstock. Some valuable information is also given on methods for destroying Scale Insects with alkaline solutions.

INSECTS INJURIOUS TO FRUITS; by William Saunders. Philadelphia: Lippincott & Co., 1 vol., 8vo., pp. 436.

It is with very great pleasure that we announce to our readers the publication of Mr. Saunders' admirable work on the Insects Injurious to the Fruits of North America, —as the volume includes those affecting the orange, the olive and the fig, we think that we may fairly apply this extended title to it. As the readers of the *Canadian Entomologist* are aware, there is no one in Canada, and very few indeed in the whole of America, so competent as our esteemed Editor to produce a work of this character. It is needless for us, then, to say more in praise of the work than that it is the crowning achievement of one who has devoted a large portion of his time and labour during the last twenty years to the practical study of insects, and whose intimate acquaintance with fruit culture in all its aspects is only surpassed by his complete knowledge of the insects, both injurious and beneficial, that affect the labours of the horticulturist. The book is written clearly and concisely throughout, in our author's well-known terse and vigorous style, and is so free from scientific and technical terms that any fruit-grower, no matter how ignorant of entomology, can readily obtain from its pages all the information that he can possibly require in reference to most of the insect friends and foes of his trees and bushes. The copious illustrations, moreover, are so beautifully executed and so true to nature that any insect referred to can be at once identified, and the proper mode of dealing with it learnt from the accompanying descriptions. But while the work is so practically valuable to those who are specially interested in fruits, we can assure our entomological readers that they will find the volume to be an admirable scientific compendium, containing an epitome of the collective knowledge of the day, and bringing together into one convenient manual the results of the researches of all the leading entomologists of America. We do not, indeed, think that we are speaking too highly in praise of the work—though we admit that it is saying a very great deal—when we express our opinion that Mr. Saunders' volume will take rank with that standard of excellence, Harris' Injurious Insects of Massachusetts, and that he has done for insects affecting fruits at the present day what his justly-famed predecessor accomplished long ago for those injurious to vegetation in general.

The plan of the work, inasmuch as it is intended especially for the use of fruit-growers, is the most satisfactory that could be adopted. The insects treated of are grouped together under the name of the particular fruit that they affect, and are arranged in order according as they attack the root, the trunk, the branches, the leaves, the fruit itself. If, therefore, a gardener finds an insect of whose habits he is ignorant, and whose name he has never heard, doing damage to one of his fruit-bearing trees, or bushes, or vines, he has only to observe to what part of the plant the attack is directed, and then he can at once turn to an illustrated account of the pest, and learn from it all its life-history and what remedies he may most effectively employ for its extermination. On the other hand, if an entomologist wishes to know in a condensed form what information is available respecting an insect that comes within the scope of the work, he can at once find what he requires by means of the carefully prepared synonymical list and complete index at the end of the book.

The volume is beautifully printed on fine paper, and neatly bound in cloth; the illustrations—440 in number—are thoroughly well done by competent artists and engravers. The fruits under which the various insects are grouped are twenty in number, viz., the apple, pear, plum, peach, apricot and nectarine, cherry, quince, grape, raspberry, blackberry, strawberry, red and white currant, black currant, gooseberry, melon, cranberry, orange, olive, and fig. As an example of the completeness of the work, we may mention that no less than sixty-four different species of insects are treated of as injurious to the apple alone, besides a number of beneficial parasites, and that these are made clear to the ordinary reader by 145 woodcuts.

We trust that the work will soon find its way into the hands of every intelligent fruit-grower, and that fresh editions of it may continue to be called for during many years to come.

C. J. S. BETHUNE.

Insects Injurious to Fruits. By W. Saunders. Philadelphia: Lippincott, 1883, 8vo. Illustrated with 440 woodcuts, pp. 436. Dedicated to the Fruit Growers of America.

No one will deny that this book supplies a long-felt want, and supplies it well. The author's long and well-known experience as a fruit grower and entomologist, gives just the qualification necessary for such work. He knows exactly what fruit growers want, and in which way and manner the needed information should be given to be useful and at the same time pleasing. Therefore the plan of this book is simple and to the point; the treatment of the enemies plain and sufficient, without tedious length: the remedies recommended backed by experience, and such as can be used by everyone. All this seems very simple and easy just as if everybody could do it. Often, I suppose, will it be said, Why was this book not published long ago? It is so eminently practical! But it is much easier to give long detailed descriptions than short ones, specially adapted to certain purposes. It is much easier to enumerate a number of proposed remedies than to select just the right one. After all, we should not forget that during late years the busy and prominent students of economic entomology have advanced this department of the science in a manner never equalled before this time.

The plan of the book is as follows: Twenty different fruits—all eatable without preparation (except quince and olive)—are treated in so many chapters. The insects injurious to them are arranged as attacking root, trunk, branches, leaves, fruit, always followed by the enemies of those enemies—the beneficial insects. The species are profusely illustrated with excellent, often superior, woodcuts; the well-known cuts of Mr. C. V. Riley are largely represented, and rather dangerous for all others.

The plain and judicious manner in which remedies are recommended is a decided and prominent feature of the book. There are no ambiguous, no large-mouthed sentences, no humbug about millions lost by such an enemy, or millions saved by such a remedy. There is nothing but plain truth, said in the most unpretentious words. I think every scientific student is deeply obliged to the author for his happy innovation.

Of course the author has, besides his own large experience, used all the rich and splendid discoveries and observations published by other scientists. The absence of quotation marks is entirely justified, as they belong to the history of the natural history, but not to a practical book intended for fruit growers. Scientific students know where such facts are published, and the author has in the preface fully satisfied all economic entomologists with his acknowledgments. It is obvious that in a book treating of the history of so many species, omissions and sometimes errors cannot be entirely avoided. Since the book is issued and the errors are insignificant, we may safely leave them to be corrected by the author himself. *Bene meruit!*

Dr. H. A. Hagen, Cambridge, Mass.

The Food Relations of the Carabidæ and Coccinellidæ. By S. A. Forbes. From Bulletin No. 6, Ill. State Lab. of Nat. Hist., Normal, Ill., Jan., 1883, 8vo, pp. 31.

Through the kindness of the author, we have been favoured with a copy of the above paper, which embodies the results of a very laborious series of microscopic examinations of the contents of the alimentary canal of insects belonging to the Carabidæ and Coccinellidæ. In the Carabidæ the results of the dissection and study of 175 specimens are given, representing thirty-eight species and twenty genera. Of the Coccinellidæ, the results of the dissection of thirty-nine specimens are given, accompanied by carefully compiled tables presenting the evidence in the most convenient and accessible forms. Prof. Forbes' experiments show clearly that the opinions hitherto held by entomologists as to the food of these insects are in many respects incorrect. While it is shown that the insects belonging to the genus Calosoma live almost exclusively on animal food, those of Chlœnius and Galerita to the extent of nine-tenths, and those of Pterostichus three-fourths; the species of Harpalus take only about twelve per cent. of animal food, Anisodactylus twenty-one per cent., Amara and Amphasia twenty-three per cent., and

Agonoderus about thirty-three per cent.: the whole series of Carabidæ examined averaging fifty-seven per cent. of animal food, the remainder being vegetable and consisting mainly of the pollen of flowers and the spores of fungi.

Of the Coccinellidæ examined, animal food constitutes but little more than one-third of the whole, the other two-thirds consisting of forty-five per cent. of the spores of fungi, four per cent of those of lichens, and fourteen per cent. of pollen. Prof. Forbes has laid all who are interested in this subject under grateful obligations to him for his valuable contributions to our knowledge in this department.

An Illustrated Essay on the Noctuidæ of North America, with "A Colony of Butterflies." By A. R. Grote, A.M. Large 8vo, pp. 85. Published by John Van Voorst, Paternoster Row, London, Eng.

This little volume is beautifully got up, printed in bold type on fine paper, and illustrated by four excellent coloured plates on which forty-five species of Noctuids are figured. These moths have been previously described in various works, but have not been figured before; and appear to have been selected to adorn this handsome little book on account of their striking beauty; they are the gems of the genera to which they belong, and well deserve to be thus made better known. Each specimen is numbered and accompanied by a brief reference or description.

In a preface of twenty-three pages the author gives a "brief" *résumé* of the sources from whence he has drawn his information; an account is also given here of the life history of the Cotton-worm from the egg to the perfect insect. This volume will commend itself for its excellencies to all those who are interested in the study of the Noctuidæ, as a valuable and beautiful contribution to this department of entomology.

Transactions of the Ottawa Field Naturalists' Club. No. 3, 1881-1882. 8vo, pp. 66, with two plates.

We commend this record of the work of the Ottawa Field Naturalists' Club to all those who are interested in Canadian Natural History. In addition to the excellent address of the President, James Fletcher, Esq., it contains reports of the work accomf plished by the Geological, Botanical and Entomological branches of the Club; a list o- the birds found in the vicinity of Ottawa, and addresses which have been delivered on various natural history subjects at the soirees held by the Club.

General Index of the Thirteen Annual Reports of the Entomological Society of Ontario.

This useful work, covering the period from 1870 to 1882 inclusive, has recently been issued. The compiler, E. Baynes Reed, Esq., Secretary-Treasurer of the Society, has spared no pains or labour in making the Index complete in every particular. It is uniform in size with the Reports, and covers thirty-five pages. Beginning with a summary of the illustrations used, and of the orders illustrated, there follows a detailed list of all the figures used in each of the thirteen Reports. The second part consists of a classified list of the insects illustrated, while the third part is a general index which is very full and complete, and will be of much value to all who may have occasion to consult its pages. A copy will be mailed to each member of the Society.

OBITUARY NOTICES.

It becomes our painful duty to announce the death of one of the founders of our Society and its first President, Prof. Henry Croft. He died at Hermanitas, Texas, on the 28th of April, of dropsy, aged sixty-three years. Ever since the organization of our Society he has taken the deepest interest in its welfare. Early in life while in Europe he was an ardent collector, devoting most of his attention to Hymenoptera; but after accepting the position of Professor of Chemistry in the University of Toronto, which he filled with much credit for many years, his time was so fully occupied with his professional duties as to leave him but little opportunity for entomological pursuits. Yet he never lost his interest in this, his favourite department of natural history. For many years past his eyesight had failed to such an extent as to prevent his collecting, and his health also was too poor to permit of it. Several years ago he resigned his position in the University and removed to Texas with his family, with the hope of benefiting his health. His death was quite unexpected. One of his much esteemed colleagues thus writes of him: "His last letter to me, written about ten days before his death, showed much of his old interest in natural history, some of his familiar humour, and a kindly interest in his friends here. I look back with pleasure on many years of work with him as a colleague. I ever found him genuinely straightforward, guileless and upright." His memory will ever be cherished by those of us who knew him well as a kind and disinterested friend.

CHARLES ARNOLD,

of Paris, Ontario, died after a short illness on the 15th day of April, 1883. Although not an active worker in the entomological field, he was a close observer of the habits of insects, especially such as are injurious to agriculture and horticulture, and in this way a most useful member of our Society. He was quiet and unobtrusive, but his work, especially as a hybridist, made him widely known. He originated many good varieties of fruits, cereals and other useful plants, some of which are much appreciated. Few men have done so much good in so quiet a way.

PROF. TOWNEND GLOVER,

long so well known as Entomologist of the Department of Agriculture in Washington, died on the 8th of September from an attack of apoplexy, at the house of his adopted daughter in Baltimore, in his seventy-first year. He was a most careful and painstaking observer, a good draughtsman and an excellent engraver, and employed his every spare moment in producing figures of American insects. In the preparation of these plates his industry was incessant, and the wonder is how, in one short life, he could have accomplished so much. The plates, with the accompanying notes, have been purchased by the United States Government, and it is hoped that they will be published in sufficient number to admit of their being available to educational institutions and students of entomology throughout the country. A complete set of his beautiful works, of which only fifteen copies are extant, have been secured for the library of our Society. He was an honorary member of the Entomological Society of Ontario, and ever felt a deep interest in our work.

V. T. CHAMBERS,

a valued contributor to the pages of the *Canadian Entomologist*, died on the 7th of August, his fifty-second birthday, at his home in Covington, Kentucky. He laboured long and ardently on the micro-lepidoptera, and in his numerous descriptions of species and careful notes on their habits, has left behind him an enduring monument. He began a series of papers on micros in the third volume of our journal, published in 1871, publishing ten papers before the end of that year. These were followed by twelve papers in volume iv., nine in vol. v., ten in vol. vi., nine in volume vii., seven in vol. viii., ten in vol ix., four in vol. x., four in vol. xi., one in vol. xii., two in vol. xiii., and one in vol. xiv., seventy-eight papers in all, besides a few communications on other entomological subjects. His writings have added greatly to the interest and value of our journal, and we hall miss him much.

DR. JAMES S. BAILEY,

of Albany, N.Y., died at his residence, No. 95 Eagle St., on July 1st, after a protracted illness. He was an enthusiastic student of insects, who devoted most of his attention to the lepidoptera, of which he possessed a fine collection. He has contributed a number of papers to the *Entomologist*, among others an illustrated one on the natural history of *Cossus centerensis*, in No. 1., vol. 11, and at the time of his death was engaged in preparing a paper on the tree-boring species of this genus for the Department of Agriculture.

PROF. P. C. ZELLER.

The death of this veteran lepidopterist has occurred, long expected and deeply regretted. Seven years younger than the century itself, Prof. Zeller was born on the 9th of April, 1808. Professor in the Prussian Real Schule at Meseritz, he was finally retired on a Government pension, and has lived since 1870 near Stettin, continuing his entomological labours in connection with the Entomological Society of Stettin. Commencing to write at an early age, Prof. Zeller has grown up with the modern science of lepidopterology. His earliest studies were upon the collections of Frau Lienig and the material brought by himself from a southern trip, which extended as far as Sicily. Zeller discovered the curious diurnal *Rhodocera Farinosa*, besides describing certain *Lycænidæ*, but his principal attention was given to the small moths of the families *Pyralidæ* to *Tineidæ*, the modern classification of which he may be said to have founded. He first cleared up the confusion as to the genera of *Phycidæ*, and by using natural characters, chiefly secondary sexual ones, he succeeded in disentangling our minds with regard to the order of nature in this obscure and neglected field of enquiry. His species and genera are very numerous and almost always valid. It is a misfortune that his valuable monograph on the *Crambidæ* was issued so nearly simultaneously with the worthless writings of Francis Walker on the same subject, so that some of our North American material has been twice named. The evidence seems to be that Zeller's paper may have been earlier. As a matter of justice it should have priority. In a series of articles, published since retirement from official duties, Prof. Zeller described a number of moths from North America. Rather more than the, unfortunately not to be avoided, proportion of synonyms mark the papers, which are otherwise models of what descriptional work ought to be. Still later, Prof. Zeller has published a beautifully illustrated volume on micro-lepidoptera, and has given a classification of *Chilo*. As I remember him in 1867, Prof. Zeller was a white-haired gentleman of very kind manners and enthusiastic for his favourite science. He was moderately thin and tall, wearing a slight whisker, but otherwise with clean shaven mouth and face. His nose was large and well-shapen, his eyes bright and the whole expression of his face pleasing. He had high cheek bones, and his countenance was unmistakably German in its salient features. Lowe, the celebrated dipterist, was then living in Meseritz, and an entomological excursion which I made with these two celebrities is among the most pleasant of my European reminiscences. Prof. Zeller's home relations were of the happiest, and the sympathy of an amiable and considerate wife was his through life. And it was a life devoted to science and learning. His accomplishments as a linguist and teacher were well known and appreciated in Germany. We know him chiefly as a biologist, the describer of the exterior structure of lepidoptera. He was fortunate enough to avoid much of the controversial spirit which accompanies descriptive entomology. Although he felt deeply the uselessness of the British Museum Lists, and his own studies were impeded thereby, he has, on the whole, little to say in criticism of others. He was not only charitable, but had schooled all natural irritability. His assistance was freely given to others, and Mr. Stainton's work on the *Tineina* acknowledges its value. He was a type of a kindly German pedagogue and naturalist which hardly exists elsewhere.

A. R. G. in *Papilio*.

CHARLES G. SIEWERS.

Charles G. Siewers died at his residence, Newport, Ky., Sept. 6th, in the sixty-eighth year of his age. For many years he has been a devoted and enthusiastic student of entomo-

logy. He spent much time in rearing the larvæ of lepidoptera, making coloured drawings of them through their stages of growth. He collected largely in coleoptera and was a very accurate observer of habits. It is due to his skill as a collector that some of the rarest species have been recorded as occurring in his locality.

DR. JOHN L. LE CONTE.

This eminent and world-renowned coleopterist died at his residence in Philadelphia, on the 15th November, 1883, after an illness of several months, in his fifty-ninth year. He was born in New York, but had made Philadelphia his home during the last thirty years. He graduated at the College of Physicians and Surgeons in 1846. In 1857 he spent several months in South America with a party of engineers who were engaged in surveying a railway across Honduras, he prepared the geological report of the party. At the beginning of the war he entered the army as a surgeon, was soon promoted to the position of medical inspector with the rank of Lieutenant-Colonel, and served in that capacity until 1865. In 1867 he was attached to the Kansas Pacific Survey, and made valuable reports on the country adjacent to the railway in Colorado and New Mexico. He was a student of science all his life, and an active or corresponding member of the leading scientific and philosophical societies of this country and Europe; but his specialty was entomology, and in the order of coleoptera he has long stood at the head of the list of American original investigators. On this subject he has been a voluminous and practical writer, and has probably done more to advance this department of science than any other man in America. His loss will be deeply felt, especially by all those engaged in the study of American beetles, since he was always ready and willing to do all in his power to assist students and collectors in every quarter.

REPORT

OF THE

LIBRARIAN OF THE LEGISLATIVE ASSEMBLY

OF THE

PROVINCE OF ONTARIO.

To the Honorable the Legislative Assembly of the Province of Ontario:

The Report of the Librarian respectfully sheweth—

That, owing to the resignation of his predecessor, Mr. Inglis, at a late period in 1883, and to the consequent shortness of the time which has elapsed since his own appointment, he is unable to give as full and detailed an account as he would have liked to do of the condition of the Library, and to make more than a few general suggestions for its improvement.

As no Supplement to the catalogue has been printed since 1882, it has been deemed expedient to issue one containing a list of the volumes added to the Library during the past year and a half. Their number has become so considerable that a mere manuscript catalogue is quite insufficient for purposes of reference.

An inspection of the catalogue shows that it contains several hundreds of volumes which are not on the shelves of the Library, and of which no trace can be found in the records. That some, at least, of these have been abstracted without the knowledge of the Librarian for the time being there is good reason to believe, and with a view to prevent such occurrences, by making access to the Library more difficult in the future, steps have been taken to open a new passage into the Crown Lands Department, so that the use of the Library as a thoroughfare may be discontinued.

It should be added that there are not a few books on the shelves which are not mentioned in one or other of the lists in the catalogue, and some that are not mentioned in any part of it. With a view to making the latter as accurate as possible, and also to facilitating the finding of books, the Librarian would recommend a thorough revision, and also a partial re-classification of the titles, with the introduction of more numerous cross references. This would entail a large amount of work, but it would greatly increase the usefulness of the Library, and facilitate access to the information it contains on special topics of all kinds.

In connection with the re-arrangement of the catalogue it would be of great advantage to have a re-arrangement of the volumes on the shelves. The present arrangement is based on the initial letters of the names of authors in each class. This leads frequently to a separation of the works of a well-known author from each other, and also to a very marked want of uniformity which detracts greatly from the appearance of the Library, and wastes much valuable space. As the shelves are movable it would in all probability be found practicable by a better arrangement to increase by fifteen or twenty per cent. their capacity for the accommodation of books.

Many of the missing volumes are members of series. It is earnestly recommended that steps be taken to have the latter made complete in all cases, whatever the intrinsic value of the set may be. The want of one volume frequently renders all but worthless two or three others. In this connection it may be noted that the series of some of the most useful periodicals do not date far back, and that frequently very valuable articles of a political or historical character are thus beyond reach. The completion of Poole's well-known Index to Periodical Literature down to the close of 1881 renders it very desirable that the back numbers of such periodicals as the New York *Nation*, the *Atlantic Monthly*, the *Fortnightly Review*, the *Contemporary Review* and *Macmillan's Magazine* should be procured if they can be had at a reasonable cost.

Some additions have been made during the year to the collection of Parliamentary documents from other Provinces. The efforts of past years to make this collection as complete as possible should be persisted in, for it is not easy to over-rate the value of this source of information on the history of the country. The same remark applies to books and pamphlets of all kinds that help to throw light on the early condition of the people, or the institutions, social or political, of any part of the Dominion. During the past few years the competition amongst collectors of this species of literature has become very keen, and the value of the material available for collection has correspondingly increased. If active steps are not taken to secure copies of all such works as have either an archœological or an historical value for Canadians the time may soon come when it will be impossible to make the collection in this Library anything like what it ought to be except at very great expense to the Province.

A good deal of new shelving has been put in this year, and the pressure on the space has thus been relaxed. It has been pointed out above that, by arranging the volumes with a view to uniformity of size, the space at present available might be considerably increased. Such a re-arrangement would necessarily involve the employment of some additional assistance of an intelligent kind, but, in the end, this would prove less expensive than an extension of the Library accommodation in any other way, to say nothing of the improvement of its appearance, and the greater facility in finding books.

Owing to the shortness of time for the selection of books since the appointment of the present Librarian, a considerable portion of the appropriation was this year allowed to lapse. As the Library stands greatly in need of extension in several of its departments, and as it costs a considerable sum each year for binding, repairing, and contingencies, it is very desirable that the amount unspent should be re-voted in addition to the ordinary appropriation for the year. It would not be at all difficult to make an advantageous use of even a larger sum in extending our Canadian collection, completing series of valuable periodicals, adding to the departments of politics and jurisprudence, and keeping the Library abreast of the times in literature and science.

It is gratifying to learn that the American Library Association has fixed upon Toronto as its place of meeting for 1884, and that a large delegation of the most prominent Librarians of Great Britain are expected to be present. A great deal has been done by the Librarians of both countries to improve the methods of classifying and cataloguing books for purposes of reference, and the holding in this city of such a convention of experts cannot fail to give a great impetus to the establishment of Public Libraries, and effect a marked improvement in their management. With a view to making adequate preparations for the reception of visitors on the occasion referred to, the local Librarians have taken steps to form an Association, and, as the Legislative Library is one of the most important in the city, it is desirable that it should be placed in as good a condition to bear inspection as may be found practicable under the circumstances.

Respectfully submitted,

WILLIAM HOUSTON,

Librarian.

REPORT OF THE COUNCIL

OF THE

Agriculture and Arts Association

OF ONTARIO,

FOR THE YEAR 1883.

Printed by Order of the Legislative Assembly.

Toronto:
PRINTED BY C. BLACKETT ROBINSON, 5 JORDAN STREET.
1884.

To the Hon. A. M. Ross,

Commissioner of Agriculture, etc.

I have the honour, on behalf of the Council of the Agriculture and Arts Association of Ontario, to present a concise Report of their proceedings for 1883, the Treasurer's Report as Audited for 1882, the Report on Prize Farms for 1883, the Report on Essays to which prizes have been awarded for 1883, the Results of the Thirty-eighth Provincial Exhibition for 1883, the Prize Awards of the Thirty-eighth Provincial Exhibition, the Secretary and Treasurer's Report of the First Fat-Stock Show, and the Report of the Veterinary College for 1882-83.

I have the honour to be,

Your obedient Servant,

HENRY WADE,

Secretary of the Agriculture and Arts Association.

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REPORT OF THE COUNCIL

OF THE

Agricultural and Arts Association of Ontario

FOR 1883.

OFFICE OF THE AGRICULTURAL AND ARTS
ASSOCIATION OF ONTARIO,
TORONTO, DECEMBER, 1883.

To the HON. A. M. ROSS,
Commissioner of Agriculture, etc., etc.

I have the honour again, on behalf of the Council of the Agricultural and Arts Association of Ontario, to present to you their Annual Report, commencing with the month of December, 1882, at which date our last Report closed.

The Council at that date consisted of the following gentlemen:—

Elected Members of the Council.—District No. 1, D. P. McKinnon, South Finch; No. 2, Ira Morgan, Metcalfe; No. 3, Joshua Legge, Gananoque; No. 4, J. B. Aylesworth, Newburgh; No. 5, John Carnegie, Peterborough; No. 6, George Graham, Brampton; No. 7, George Moore, Waterloo; No. 8, J. C. Rykert, M.P., St. Catharines; No. 9, Henry Parker, Woodstock; No. 10, J. Hunter, Eden Grove; No. 11, L. E. Shipley, Greystead; No. 12, Stephen White, Chatham; No. 13, Charles Drury, M.P.P., Crown Hill.

Ex-officio Member.—Hon. S. C. Wood, Commissioner of Agriculture, etc., Toronto.

Officers.—President—J. B. Aylesworth, Newburgh; Vice-President—C. Drury, Crown Hill; Treasurer—George Graham, Brampton; Secretary—Henry Wade, Toronto; Auditors—John I. Hobson, Mosborough, and J. A. Widdifield, M.D., Newmarket.

Thursday, December 7th, 1882.

The Council met to-day at the Agricultural Hall, Toronto, at 2 p.m. Members present—The President, C. Drury, M.P.P., and Messrs. Carnegie, Legge, Parker, White, Graham, Shipley, Aylesworth, Morgan, Rykert, M.P., Hunter, and Moore.

At the President's request, the regular proceedings were suspended, to allow the Hon. S. C. Wood to address the Council. Mr. Wood informed the Council that the Government had been considering the advisability of establishing three creameries in different parts of the Province, for the purpose of giving instruction in butter-making. He wished the Council to consider the matter and report to him. The amount of butter annually manufactured in the Province was fifty millions of pounds, a great proportion of which was inferior in quality; to improve the general quality of the butter would be to add greatly to the wealth of the Province. After commenting favourably on the Hon. Mr. Wood's remarks, the President suggested the appointment of a small committee to consider the subject.

The Secretary then read the minutes of the meetings held in Kingston during the Exhibition, which, on motion, were confirmed and signed by the President.

Numerous communications were then read and considered in order:—A letter was read from Thomas McCrae, Esq., of Guelph, presenting to the Association the series of volumes of the "Galloway Herd Book," of Scotland, as far as published. Mr. White moved, seconded by Mr. Legge, That the thanks of the Council are due, and are hereby tendered to Thomas McCrae, Esq., of Guelph, for the volumes of the "Galloway Herd Book," so kindly presented. Carried.

A communication was read from Mr. E. W. Perry, of Chicago, presenting the Secretary with four volumes of the "American Berkshire Record," and the Secretary presented them to the Council, whereupon it was moved by Mr. Moore, seconded by Mr. Hunter, That the thanks of the Council be hereby tendered to the Secretary and Mr. E. W. Perry, for the handsome gift, and that a set of volumes containing the transactions of this Board, so far as can be made complete, be sent to Mr. Perry forthwith. Carried.

A letter was read from Henry Longworth, Esq., Chairman of Government Farm, P. E. Island, thanking the Council for the set of Herd Books presented him.

A communication was read from John I. Hobson, Esq., Mosborough, thanking the Council for their extra grant of fifty dollars given him on the Prize Farms' Report.

Several unimportant communications were read and considered.

A circular was then read from the Mayor of Toronto, asking the Council to appoint a delegate to represent the Board at the Semi-Centennial Celebration to be held in Toronto, in the month of March, 1884. H. Parker, Esq., moved, seconded by Mr. S. White, that the Secretary, Mr. Henry Wade, be the delegate appointed by the Council. Carried.

A lease, prepared by the firm of Bethune, Moss, Falconbridge & Hoyles, in accordance with the resolution passed by the Council, March 24th, 1882, was then read, the lease being to Mr. P. Jamieson of that part of the building belonging to the Association and now occupied by him, he agreeing to pay two hundred dollars a year more for the heating of the same. Lease dated August 1st, 1882, for ten years. Mr. Jamieson executed the lease, and it is deposited in the safe of the Association.

A letter was read from H. J. Hill, Secretary of the Industrial Exhibition, asking the Council to fix the time for holding the Provincial for next year.

The Secretary then read a report of his visit to the Chicago Fat Stock Show, and of his interviews with the various Breeders' Associations. He recommended the Council to establish a similar show in Toronto, and also made some suggestions regarding Galloway and Ayrshire Herd Books, a full report of which is published in our report to the Commissioner for 1882.

Moved by Mr. Carnegie, seconded by Mr. Moore, that the Secretary be instructed to forthwith call the attention of the several Electoral Agricultural Societies in the several divisions in which elections of members of this Council are to be held next month, to sub-section 4 of section 20 of the Agricultural Act of last session, relating to such elections. Carried.

It was at this juncture that H. Parker, Esq., moved, seconded by Geo. Moore, Esq., that the next Provincial Exhibition be held in the city of Guelph, provided the proper guarantee be still given. Mr. Morgan thought that Ottawa had superior claims to this Exhibition; the Ottawa people had expended large sums of money upon their grounds, and would do all that was required. He moved that the vote be held over till next day.

Mr. Aylsworth agreed with Mr. Morgan, in favour of Ottawa, and seconded his resolution. Messrs. Carnegie and Parker both spoke strongly in favour of Guelph, as also Messrs. Graham and White. On division, Guelph was carried by a large majority.

Moved by Mr. Carnegie, seconded by Mr. Shipley, that the Exhibition be opened on Monday, *September 24th*, next, and that it continue one week. Carried.

By the same mover and seconder, that the Finance Committee be instructed to prepare the estimate for 1882 for the Commissioner of Agriculture. Carried.

Moved by Mr. Carnegie, seconded by Mr. Parker, that the President, Messrs. Aylsworth, Morgan, and Professor Buckland, be a committee to decide what shall be the subjects for prize essays for 1883. Carried.

Moved by Mr. Carnegie, seconded by Mr. Legge, that the committee on the estimates for 1883, ask for five hundred dollars toward the educational scheme of Professor Mills. Carried.

Moved by Mr. Parker, seconded by Mr. Graham, that the President and Messrs. Rykert, Legge, White, and Hunter, be a committee to report on the questions relating to Forestry. Carried.

Moved by Mr. Legge, seconded by Mr. White, that the Secretary be instructed to send each member of the existing Council a copy of Vols. V. and VI. of the "Canada Shorthorn Herd Book." Carried.

Meeting adjourned until 7.30 p.m.

Evening Session, 7.30 o'clock.

Same members present; the President in the chair.

Mr. W. H. Lynch addressed the Council on the subject of creameries, and on the feasibility and advisability of educating the people up to a better knowledge of the dairy interest and processes. He showed that this might be done by practically illustrating to the farmers in various parts of the Province, the manner of making butter by modern apparatus, and suggested that a manual on the butter interest and butter making might be published and circulated; also lectures might be delivered to advantage, accompanied by actual butter making with the modern appliances before audiences in different parts of the country. He gave it as his opinion that private dairies would run out creameries in time. As an encouragement to the industry he suggested that dairy utensils be given as prizes at our exhibition.

Mr. J. B. Bessy, of Georgetown, was also heard on the same subject. He, too, thought that a certain number of creameries should be established throughout the country, that they should be fitted up with the best utensils, and that practical lessons should be given to farmers' wives and daughters who would attend for a course of instruction.

Moved by Mr. Rykert, seconded by Mr. Hunter, That Messrs. Parker, Shipley, Carnegie, and Moore be a committee to report on the dairy interest. Carried.

Moved by Mr. White, seconded by Mr. Parker, that Mr. John I. Hobson, of Mosborough, be one of the auditors for the Association. Carried.

A letter from the Commissioner of Agriculture was now read, stating that he had appointed Mr. John B. Smyth, of London, as the other auditor.

Professor Brown's official report on the Live Stock at the Provincial Exhibition at Kingston was then presented, and the Secretary was requested to examine it, and have it published in the Report to the Commissioner.

Moved by Mr. Rykert, seconded by Mr. Legge, that one hundred dollars be paid to Prof. Brown for his services in the capacity of Live Stock Reporter. Carried.

Mr. Parker then presented the Report on Finance. The report certified the correctness of certain accounts, and recommended the payment of various accounts, given in the detailed report. The Committee also recommended that, in accordance with the amended Act, the following detailed statement, amounting in the aggregate to $10,000, be sub-

mitted to the Lieutenant-Governor in Council as their estimate of the sum required for the purposes of the Association for the ensuing year:—

Prize Farms	$250 00
Council	725 00
Veterinary College	125 00
Essays	100 00
Salaries	1,500 00
Exhibition	5,000 00
Ploughing Matches or Fat Stock Show	1,200 00
Postage and Printing	600 00
Education	500 00

The Committee recommended that the Secretary be instructed to submit the above estimate before the 15th of the present month.

The report was signed by the Chairman, H. Parker, Esq., and dated *December 7, 1882.*

Moved by H. Parker, seconded by Ira Morgan, that the Report of the Finance Committee, just read, be adopted by this Council. Carried.

Signed. CHARLES DRURY,
President.

Friday, December 8, 1882.

The same members present. The following report of the Herd Book Committee was read by Mr. Carnegie:—

1. That the sixth volume of the Canada Shorthorn Herd Book is now ready for the printer, and will be ready for delivery before the end of the year; and that it be sold at the same price as the fifth volume—namely two dollars and fifty cents. They would also recommend that the seventh volume be placed in the hands of the printer as soon as possible.

2. With regard to the Galloway Herd Book, your Committee would recommend that the first volume be published as soon as possible, under the name of the "North American Galloway Herd Book," and that in future the pedigrees forwarded for registration, in deference to the views of the Galloway Breeders' meeting in Chicago, be submitted to committees appointed by the Galloway Breeders' Association of North America.

3. That, inasmuch as the breeders of Ayrshires have been long promised the publication of their Herd Book, and as it can be accomplished for a very reasonable amount, your Committee would recommend that the first volume be published, under the name of the "Dominion Ayrshire Herd Book," as soon as possible.

4. In publishing the Galloway, Ayrshire, and Shorthorn Herd Books (after the seventh volume), your Committee would recommend that the males be entered numerically, instead of alphabetically, as heretofore.

5. Your Committee, recognizing the importance of encouraging those engaged in the production of fat stock—especially with the view to early maturity—would endorse the recommendation of your Secretary as to the expediency of holding a Fat Stock Show annually in the city of Toronto; and would recommend that representatives of the Toronto Electoral Division Agricultural Society and breeders of fat stock be invited to meet with the members of the Council on the evening of the March meeting, with a view to perfecting arrangements for holding such an exhibition in December, 1883.

Signed. JOHN CARNEGIE,
December 8, 1882. *Chairman.*

Moved by Mr. Carnegie, seconded by Mr. White, that the Herd Book Committee's report be adopted. Carried.

The Committee on Forestry then presented the following report:—

To the President and Council of the Agricultural and Arts Association.

The Committee appointed to consider the question of Forestry beg leave to report as follows:—

They have considered the question of planting forest trees throughout the Province, and are of the opinion that the Government should be memorialized to pass some enactment whereby municipalities may be empowered to encourage the planting of trees through the means of municipal aid, and also supplement the same by Government aid.

Your Committee are of the opinion that the arguments in favour of the restoration of the forests are so great that it only requires the attention of the Government being directed thereto, to induce them to provide the necessary legislation to give it encouragement.

Your Committee beg leave to submit a memorial for presentation to the Government.

All of which is respectfully submitted.

Signed. J. C. RYKERT,
December 8, 1882. *Chairman.*

COPY OF MEMORIAL.

"*To the Honourable the Legislative Assembly of the Province of Ontario.*

"The Petition of the Agricultural and Arts Association of the Province of Ontario humbly sheweth:

"That, in view of the rapid destruction of the forests of Ontario, your Petitioners are of the opinion that an effort should be immediately made to encourage the planting of trees by municipalities throughout the Province.

"That, with this object in view, it would be advisable to amend the Municipal Act, so as to remove all doubt as to the power of municipalities to encourage the planting of trees, by granting aid thereto, and to provide means for the protection of the same.

"Your Petitioners would also suggest the advisability of the Government supplementing municipal aid by an annual grant from the public funds."

Upon the reading of the above, it was moved by Mr. Carnegie, seconded by Mr. Hunter, that the above report and memorial be adopted and engrossed on the minutes. Carried.

The Council then adjourned to meet again at 2 o'clock.

Friday, Dec. 8, 2 o'clock p.m.

Business having been resumed, a telegram was read from the Mayor of Guelph, Geo. Sleeman, Esq., to a member of the Council, Geo. Moore, Esq., stating that Guelph would furnish all accommodation necessary for the Exhibition.

At this meeting important reports were made by the Committees on Creameries and Essays respectively.

The committee to which was referred the Hon. Mr. Wood's proposal with regard to the establishment of three Provincial Creameries for the education of the people in the art of butter-making begged leave to report:

That while they are thoroughly agreed with Mr. Wood that the subject is one of great importance to the people of this Province, and would justify any reasonable expenditure of the public money for such a purpose, yet that their present information leads them to the conclusion that it would be unwise for the Council of this Association to commit itself to any definite scheme for the attainment of so desirable an object, without further investigation into the merits and demerits of the various schemes suggested to that end.

Moved by Geo. Graham, seconded by Geo. Moore, that the above resolution be adopted. Carried.

The Special Committee on Essays for 1883 also presented their report as follows:—

Your Committee are of opinion that Essays on the following subjects would be of great utility at the present time:—

I. The best and most practicable means of improving the quality of butter in Ontario, both as regards its manufacture in private dairies and in creameries; special attention being paid to the wants and capabilities of the Province in adapting this important article to the present requirements both of the domestic and foreign markets.

1st prize, special, by Provincial Government $100 00
2nd prize, by Agricultural and Arts Association 50 00

The manuscript not to exceed thirty pages foolscap.

II. The increasing tendency of the times for farmers' sons to leave the occupation of their fathers for other pursuits. Its cause and remedies.

1st prize $30 00
2nd prize 20 00

The manuscript not to exceed twenty-five pages.

N.B.—No prize to be awarded to essays not up to the standard decided on by the Awarding Committee.

Manuscripts to be sent to the Secretary of the Agricultural and Arts Association, Toronto, with one dollar, member's fee, not later than 1st August, 1883.

The meeting then adjourned.

ANNUAL MEETING OF THE AGRICULTURAL AND ARTS ASSOCIATION FOR THE ELECTION OF OFFICERS.

Tuesday, March 20, 1883.

The Council did not meet again until this date. Summoned to the call of the Secretary, the meeting was held at the Society's Board-room, in Agricultural Hall. Members present—Messrs. C. Drury, M.P.P., G. Moore, D. P. McKinnon, Aylesworth, Hunter, Legge, Parker, White, Snell and Shipley.

The Secretary read a communication from Professor Buckland, Assistant Commissioner of Agriculture, as follows:—

To Henry Wade,

Secretary of Agricultural and Arts Association of Ontario.

Sir,—I beg to inform you that the following gentlemen were elected members of the Council of the Agricultural and Arts Association for the next three years, by the members of the Electoral District Societies, at their annual meetings, in accordance with the Statute relating thereto—

Division No. 5 .....John Carnegie, Esq., M.P.P., Peterborough.
" 6 .....J. C. Snell, Esq., Edmonton.
" 7 .....Geo. Moore, Esq., Waterloo.
" 8 .....J. C. Rykert, Esq., M.P., St. Catharines.

I have the honour to be, Sir,
Your obedient servant,

George Buckland,
Asst. Com. of Agriculture.

Owing to the absence of several members, the annual election of officers was postponed till the evening session. Mr. Drury presiding at the afternoon meeting.

The minutes of the December meeting were read by the Secretary, confirmed, and signed by the President.

On motion of Mr. Aylesworth, Mr. R. J. Doyle and Mr. McMurchy addressed the Council briefly on the advisability of having a "Grange Day" at the forthcoming Provincial Exhibition. They assured the Council that they would make every effort to ensure the success of the day.

On the suggestion of the President, and on motion, a committee, consisting of the President, Messrs. Parker and Aylesworth, was appointed to confer with the Patrons of Husbandry on the subject.

Alderman Gowdy, of Guelph, was then introduced by Mr. Moore.

Mr. Gowdy explained that the Guelph Council and Agricultural Societies were anxious to know what accommodation would be required, and would like to have the next meeting of the Council held at that city.

On motion of Mr. Aylesworth, seconded by Mr. Parker, it was resolved that the next meeting of the Council be held at Guelph on the 24th of April next, at two o'clock p.m., to examine the Exhibition Grounds, and ascertain what additions will be required in the way of buildings; also to revise the Prize List for the present year, and that the Superintendent be notified to attend the meeting with estimates of requirements.

A letter was then read from Mr. H. J. Hine, Secretary of the Shorthorn Society of Britain, thanking the Council for the 5th and 6th vols. of our Herd Book, and stating that the Association was now placed on their exchange list, and that he had just mailed the 25th vol. of Coates' Herd Book to our address.

Also a communication from Mr. Acton Burrows, Deputy Minister of Agriculture, acknowledging the 6th vol. of the Canada Shorthorn Herd Book.

A letter was read from George Leclere, Secretary of the Board of Agriculture, thanking the Council for the completion of their set of Herd Books. One from the Hon. Henry Longworth, acknowledging the 6th vol. for the Prince Edward Stock Farm.

A copy of a resolution of the New Brunswick Board of Agriculture, sent by Julius S. Inches, Secretary, was as follows:—

"Moved by Mr. Fairweather, seconded by Mr. Campbell, That the thanks of the Board be given to the Agricultural and Arts Association of Ontario for the timely and valuable present of five volumes of the Canada Shorthorn Herd Book. Carried."

A letter was read from the Hon. John Burr Plumb, stating that he had given prizes for farms in Niagara Township, asking leave to present two medals made on the Association's die by paying for them. Request granted.

Letters were read from S. D. Fisher, Secretary of Illinois State Board of Agriculture, and J. D. Smyth, Secretary of Western Fair, saying that they would reciprocate in publishing dates of respective Shows.

A letter was then read from the Hon. S. C. Wood, Commissioner of Agriculture, to the Secretary.

TORONTO, *12th Dec., 1882.*

SIR,—I beg to acknowledge receipt of yours of 11th inst., enclosing motion carried by the Association to the following effect:—"That the Treasurer be instructed to pay the Ontario Government the sum of $3,000 in full for the Council's share of the expenses incurred by the Government in connection with the Agricultural Hall."

I have to express my surprise at such a resolution being carried, when it must be borne in mind that the Government Engineer was allowed to take charge of the works going on, at the request of the Association, and that the Government were asked to advance the money to complete the works, such money to be refunded before the end of the year. It now turns out that the cost has been more than anticipated, the Engineer furnishing accounts showing that something near $7,000 is the proportion which the Association should pay, and that all that should be charged to the offices, which the Association kindly allowed the Government to have, is a little over $3,000. Upon what grounds the Association can claim that the Government, who, wishing to meet the views

of the Association, allowed their Engineer to take charge of the works, though not under the direction of the Government, should pay anything more than the actual cost connected with the offices improved for their use, I really cannot understand. I must say this, that it is most unfair; and that the terms of the resolution cannot be accepted. We shall expect the Association to pay the amount apportioned to them by the Engineer, and which he says he has the accounts to sustain.

Your obedient servant,

S. C. Wood,
Commissioner of Agriculture.

Henry Wade, Esq.,
Secretary Agricultural and Arts Association, Toronto.

Evening Session, March 20th, 1882.

Members present.—The same as at the afternoon session, with the addition of Mr. Ira Morgan and J. C. Rykert, M.P.

The chair was taken by Mr. H. Wade, the Secretary, who after calling the meeting to order, explained that the election of officers for the coming year was in order.

On motion of C. Drury, M.P.P., the retiring President, seconded by Mr. Ira Morgan, Mr. D. P. McKinnon, the retiring Vice-President, was elected President by acclamation.

Mr. McKinnon then took the chair, and briefly thanked the Council for the high compliment paid him, and was also pleased to see the handsome and commodious rooms now occupied by them.

It was then moved by Mr. Henry Parker, seconded by Mr. J. B. Aylesworth, that Mr. Joshua Legge, of Gananoque, be appointed Vice-President, this was also unanimously carried.

Moved by Mr. Henry Parker, seconded by Mr. Stephen White, that Mr. George Graham, of Brampton, be re-appointed Treasurer, and that as he was not now a member of the Council, his actual travelling expenses be paid during Exhibition week, in addition to his salary, which was to be the same as before. Carried.

Moved by Mr. Henry Parker, seconded by Mr. Geo. Moore, that Messrs. Aylesworth, Drury and the mover, be appointed a committee to strike the Standing Committees. Carried.

Mr. Drury proposed that steps be taken for a settlement with the Government with regard to the alterations to their building, in answer to Hon. Mr. Wood's letter. It was resolved that Messrs. Drury, White and Morgan, be a committee to wait on the Commissioner for that purpose.

The following gentlemen from the Electoral Division Society, by invitation, then waited on the Council, for the purpose of organizing a Fat Stock Show:—Andrew Smith, V. S., President; Messrs. J. J. Withrow, P. G. Close, Wm. Rennie, J. E. Mitchell, Geo. Vair, Alex. McGregor, D. C. Ridout, and J. C. Edwards, Secretary.

Mr. Drury welcomed the gentlemen, and introduced the matter, and hoped that a show would result that would be an honour to the country. President McKinnon said it had been considered that it would require one thousand dollars in premiums to get up a good show, and that the Council had agreed informally to grant five hundred dollars, if the Electoral Division Society would grant the same amount.

Dr. Smith and Mr. Rennie both thought they could not afford more than three hundred dollars, as they had a Flower Show to run also. Mr. Withrow explained that the Show would be a benefit to the city and the Province at large, and he thought they could raise the additional two hundred dollars. The other gentlemen also thought they could, and it was agreed between them that five hundred dollars would be forthcoming.

It was then moved by President McKinnon, seconded by President Smith, and resolved, "That the Agricultural and Arts Association, and the Toronto Electoral Division Society, do hold a Fat Stock Show in the month of December next, at the city of Toronto,

and that each Association grant the sum of five hundred dollars towards that end, and that if profits are made, they be equally divided at the end of the year ; or if there are losses, they be equally met ; and that a committee of four gentlemen from each Association, be appointed to manage the said Show." The deputation then retired.

It was then moved by Mr. I. Morgan, seconded by Mr. H. Parker, and resolved, "That Messrs. Drury, Moore, Snell and Carnegie, be a committee to act in conjunction with the committee appointed by the Electoral Division Society, to manage the Fat Stock Show."

A resolution was now read from the Electoral Division Society, stating that D. Smith, J. J. Withrow, Wm. Rennie and J. E. Mitchell were there committee to the Fat Stock Show.

Moved by Mr. J. B. Aylesworth, seconded by Geo. Moore, and resolved, "That this Council appropriate the sum of five hundred dollars towards the getting up of a Fat Stock Show, to be held in Toronto in December next."

The meeting then adjourned until 10 a. m. Wednesday.

FAT STOCK SHOW.

Tuesday Evening, after Council Meeting.

Members present.—Messrs. Drury, Moore, Snell, Carnegie and Wade, from Council ; and Smith, Rennie, Withrow, Mitchell and Edwards, from city.

On resolution, Dr. Smith, V. S., was elected Chairman ; Henry Wade, Secretary, and J. P. Edwards, Treasurer.

It was decided that if the Guelph Fat Cattle Club would alter the date of their Snow from the 13th and 14th of December, that the Toronto Show should be held on the 14th and 15th of December, and Mr. Moore and Mr. Snell were appointed a committee to ask them so to do. Meeting then adjourned.

Wednesday, 21st March, 10 a.m.

Council met at Board-room, pursuant to adjournment.

Members present.—President McKinnon, Messrs. Morgan, Legge, Aylesworth, Carnegie, Snell, Moore, Rykert, Parker, Hunter, Shipley, White and Drury.

Mr. Parker then read the following report :—

The Committee appointed to strike the Standing Committees for 1883, beg to report the following names for said committees :—

Executive and Building.—Messrs. Parker, Moore, Rykert, Aylesworth and Shipley.
Finance and Printing.—Messrs. Drury, White, Carnegie and Morgan.
Gates and Turnstiles.—Messrs. Aylesworth, Legge, Hunter and White.
Herd Books.—Messrs. Carnegie, Drury, Snell and Wade.
Prize Farms.—Messrs. Drury, Snell and Carnegie.

All of which is respectfully submitted.

H. Parker,
C. Drury,
J. B. Aylesworth.

On resolution the report was adopted.

Mr. Drury then presented the following Report, which was also adopted :—

The Committee appointed to arrange with the Executive Committee of the Provincial Grange, in reference to a "Farmer's Day," at the Guelph Exhibition, beg to report :—

That subject to the approval of the Council, your Committee have made an agreement with the Grange to pay to them twenty per cent. of the excess of gate receipts of Thursday, over that of the previous day, and that the whole expense of advertising be paid by the Grange.

All of which is respectfully submitted.

CHARLES DRURY, *Chairman.*

Toronto, March 21st, 1883.

Moved by Mr. Rykert, seconded by Mr. White, and resolved, That the divisions of the Ploughing Matches be as follows:—

No. 1	Districts	1,	2	and	3.
" 2	"	4,	5	and	6, and 13.
" 3	"	7,	8	and	9.
" 4	"	10,	11	and	12.

And that the sum of $300 be appropriated to each of the divisions, and that the Committees for the respective divisions consist of three members of each division.

Mr. Aylesworth moved, that in view of the large extent of territory comprised in the second division, one hundred dollars additional be given to that division. This resolution was lost.

On motion of Mr. S. White, seconded by Mr. Carnegie, it was resolved, That the several Committees on Ploughing Matches make their own arrangements, and the Electoral Agricultural Societies be asked to contribute, and any county society granting twenty-five dollars or upwards, the President will become *ex-officio* a member of the Committee.

Moved by Mr. Legge, seconded by Mr. Aylesworth, and resolved, That in view of the great importance of the dairy interest to the farmers of the Province of Ontario, and the necessity of encouraging the production of an improved quality of butter, this Council desires to express its hearty approval of the measure passed in the late session of the Legislature, making provision for the establishment of public creameries in the Province, for instruction in all the processes of butter-making, both in the dairy and the creamery system; and that the Council will cheerfully co-operate with the Commissioner of Agriculture in giving practical effect to the proposed object of the Creamery Act. Carried.

The meeting then adjourned until 2 p.m.

Wednesday, 21st March, 2 p.m.

Same members present.—President McKinnon in the chair.

Mr. Moore moved, seconded by Mr. S. White, That Messrs. Drury, Carnegie, Prof. Buckland and Prof. Mills, of Guelph, be a committee to report at the next meeting a plan for carrying out the Educational scheme, for which five hundred dollars is appropriated in the estimates of the current year. Carried.

Moved by Mr. Parker, seconded by Mr. White, and resolved, That the Secretary advertise for tenders for the printing of the Association for the coming year.

Mr. A. Smith, V. S., was also allowed to pay an account of one hundred and eighty dollars out of the Veterinary Grant in the hands of the Association.

Mr. Drury then presented the Financial Statement as submitted by the Treasurer, for 1882, as below, and the Report of the Auditors thereon, shewing that on the 1st of January, 1882, there was cash in the bank amounting to $4,608.36; that since then there has been received $28,499.36, and expended, $26,073.56, leaving a balance on hand on the 1st of January, 1883, of $6,984.16, as per abstract below :—

ABSTRACT OF RECEIPTS AND EXPENDITURES of the Agricultural and Arts Association, as classed by the Auditors, for the Year ending 31st December, 1882.

RECEIPTS.	$ c.	DISBURSEMENTS.	$ c.
To Balance on hand, January 1st, 1882	4,608 36	By Prizes	11,735 50
" Prince of Wales Fund, Special Deposit	800 00	" " Medals	1,083 45
" Interest	189 93	" Miscellaneous, Insurance, etc	185 20
" Rents	1,332 00	" Postage	407 50
" Herd Book, Sales and Registration Fees	2,368 60	" Salaries, A. & A. Association	1,280 00
" Dominion Grant	5,000 00	" Interest	350 00
" Legislative Grant	10,000 00	" Petty Cash, Secretary's office	43 67
" Prize Account	480 00	" Office expenses, Stationery, etc	87 50
" Exhibition Receipts—Members' Fees	723 00	" Prize Farms	209 00
" " " Turnstiles and Gates	6,054 65	" Herd Book, including Printing, Stationery and proportion of Salaries	2,087 41
" " " Booth Sales	462 00	" Ordinary Stationery and Printing	76 85
" " " Licenses	153 00	" Furniture (Safe and Stove)	240 40
" " " Stable Fees	179 50	" Council Expenses—Ordinary	764 70
" " " Poultry Fees	54 50	" " Exhibition	737 12
" " " Cattle Feed	168 00	" Library	13 50
" " " Lumber Sold	34 00	" Veterinary College	125 00
" Furniture Sold	127 75	" Legal Expenses	23 00
" J. R. Craig, balance	289 54	" Manitoba Exhibit	1,525 00
" Miscellaneous	24 16	" Exhibition Expenses including Printing and Stationery	5,048 76
" Refund, error in Postage $2; error in Exhibition Expenses $6.73	8 73	" Balance, Cash on hand, including Prince of Wales' Fund	6,984 16
	$33,057 72		$33,057 72

Audited and found correct,

JOHN I. HOBSON, JOHN B. SMYTH. } *Auditors.*

TORONTO, *January 12th, 1883.*

STATEMENT.—Assets and Liabilities of the Agricultural and Arts Association of Ontario, 31st December, 1882.

ASSETS.		LIABILITIES.	
	$ c.		c.
To Cash in Bank and in Treasurer's hand	6,184 17	By Mortgage on Real Estate	5,000 00
" Real Estate, corner Queen and Yonge Streets	30,000 00	" Balance due Veterinary College Museum	514 81
" Special Deposit Bank of Commerce, Prince of Wales' Fund	800 00	" Dominion Grant, Nova Scotia	327 14
" Library, 1,628 volumes	3,000 00		
" Herd Books: 22 copies of Vol. I	44 00		
" " 76 " " II	190 00		
" " 16 " " III	40 00		
" " 362 " " IV., 1st part	543 00		
" " 126 " " IV., 2nd part	189 00		
" " 134 " " V	201 00		
" Office Furniture, Safe, etc	500 00	" Balance of assets over liabilities	35,849 22
	$41,691 17		$41,691 17

Audited and found correct,

JOHN I. HOBSON, JOHN B. SMYTH, *Auditors.*

TORONTO, *January 12th, 1883*

The Treasurer's Report, as tabulated, was adopted, and a number of accounts were passed, which completed the business before the Council. The meeting then adjourned, to meet again at Guelph on the 24th of April, at 2 o'clock.

Guelph, April 24th, 1883.

The Council met at the City Hall at 3 o'clock p.m. Members present.—President, D. P. McKinnon; Messrs. Drury, Parker, Snell, White, Shipley, Aylesworth, Moore, Morgan, Legge, and Hunter; H. Wade, Secretary; and A. H. White, General Superintendant.

Previous to the meeting most of the Council visited the Fair-grounds along with the Local Committee. Mr. Carnegie, who had come up the day before to meet the Educational Committee, was telegraphed for and had to leave before the meeting. Mr. White, of Chatham, was also telegraphed for, and had to leave during the afternoon.

The minutes of the March meeting were read and confirmed. A communication was read from John Dryden, M.P.P., President of the Shorthorn Breeders' Convention, asking that animals registered in their book be allowed to exhibit at the Provincial Exhibition. This was allowed. A letter was read from J. Crawford and F. Malvern, asking that one of the Provincial Ploughing Matches be held in the East Riding of the county of York, and stating that their Agricultural Society would contribute the sum of three hundred dollars towards it. At a later date of the meeting another one hundred dollars was voted to district No. 2, with the condition that two matches would be held in that division—one in East York, and one in Peterborough. A letter was read from A. Gifford, secretary of the Ontario Provincial Grange, asking the Council to have a trial of self-binding reapers on one of the days of the Exhibition, and to ask the manager of the Ontario School of Agriculture to sow a field late with three kinds of grain if possible, the land to be furrowed.

A committee consisting of Messrs. Aylesworth, Hunter and Legge were appointed to report on the matter. A letter was read from Mr. Thos. Shaw, of Hamilton, asking leave to present some special prizes at the Provincial Exhibition; granted. A letter was read from the National Manufacturing Co., Ottawa, offering a tent valued at fifty dollars, to be given as a special prize, without conditions; this was accepted. A letter was read from the Empire Horse and Cattle Food Co., offering special prizes; accepted. A letter from James Rennie, of the Market Seed Store, was read, offering a Chill Plow as a special prize for Timothy seed; accepted. A letter was read from Wm. Weld, of the *Farmers' Advocate*, offering $100 for special prizes; also accepted. Mr. Drury reported that after paying Dr. Smith's account for microscopes, etc., there was a balance of three hundred and thirty-four dollars and eighty-one cents at the credit of the Veterinary Museum Fund. The Printing Committee reported that after examining the tenders they had awarded the *Globe* the first eleven items, and the remaining items to the *Mail*.

Meeting then adjourned until 7 p.m.

Tuesday Evening, April 24th. 7 p.m.

Council Chamber, Guelph. Same members present.

A letter was read from Prof. Brown asking the privilage of holding a public sale one of the days of the Exhibition, and that accommodation be provided for about sixty head of cattle, two hundred sheep, and twenty swine. The Executive Committee, after consideration, granted that, and allowed Friday for the day.

Mr. Drury then presented the report of the Educational Committee:

The committee appointed to report on the proposed scheme of examinations in Agriculture beg to recommend as follows:—

1. That a course of reading be prescribed, examinations held, and certificates granted annually.

2. That the first examination be held towards the end of June, or early in July, 1884.

3. That, the Minister of Education having expressed his willingness to assist the Council in carrying out the object in view, the examinations be held at the same time and places as the High School Intermediate Examinations, presided over by the same persons, and subject to the same rules and regulations as said Intermediate Examinations.

4. That the examination papers be prepared by persons to be chosen by the Council, be submitted to a special committee of not more than three, and after approval, be printed and sent out with the Intermediate papers.

5. That the answers of the candidates be returned to the Department of Education in sealed envelopes with the answers of Intermediate candidates, to be afterwards taken charge of and examined under the direction of the Council of the Agricultural and Arts Association.

6. That the sum of two hundred and ten dollars be offered in prizes, as follows:—For third-class candidates, four prizes of $30, $25, $20, and $15, open only to those who have never been in attendance at any agricultural school or college here or elsewhere. For second-class candidates, three prizes of $25, $20, $15, open only to those who have never been in attendance at any agricultural school or college; and three more of the same value open to all candidates.

7. That the course of reading be as follows:

COURSE OF READING FOR THIRD-CLASS CERTIFICATES.

1. Different kinds of soils; their properties; variations in their composition, texture, and condition; essential differences between good and poor soils. Substances found in plants; and sources whence they are obtained. Exhaustion of land; causes; how prevented; best modes of restoring exhausted lands. Necessity for manure; production and waste of farmyard manure; use of artificial manures; lime, salt, gypsum, bone dust, and mineral superphosphates as manures.

2. *Tillage Operations.*—Ploughing, harrowing, rolling, etc.; respective advantages and disadvantages of deep and shallow fall and spring ploughing; subsoiling; fallowing; drainage, where necessary and how done; effects of thorough tillage on lands; times and methods of sowing; after cultivation; harvesting.

3. The crops which each kind of soil is best adapted to produce; succession or rotation of crops; importation and necessity of rotation; rotations suitable to different soils and climates in Ontario; good courses of cropping; bad courses of cropping.

4. *Live Stock.*—Best kinds of stock for various farms and localities; summer and winter management; economy of good management; general rules for guidance in breeding; conditions and circumstances favourable to cattle farming, sheep farming, dairy farming, and mixed husbandry.

5. *Food.*—Chemical elements and compounds found in the most important kinds of feed and fodder which can be successfully grown in Ontario; different materials necessary for growth, maintenance of heat, and laying on flesh; feeding and fattening of animals.

COURSE OF READING FOR SECOND-CLASS CERTIFICATES.

1. *The Plant.*—Relations of the mineral, vegetable, and animal kingdoms to each other; nature and sources of plant food; composition of the most important crops grown in Ontario; period of highest nutritive value; chemical changes in the ripening of fruit, grain, and fodder crops; influence of climate on perfection of growth.

2. *The Soil.*—Physical and chemical properties of soils; classification of soils as determined by these properties; comparative fertility of different varieties of soil; active and dormant ingredients of soils; best means of converting dormant into active.

Chemical and physical conditions affecting the barrenness and fertility of soils; causes of unproductiveness; power of different soils to hold manures; influence of frost, aspect, elevation and climate on the productiveness of soils.

3. *Manures.*—Production, management and application of farmyard manure; conditions which influence its quality; comparative values of cattle, sheep, and horse manures; green crop manuring; composts.

Properties and uses of artificial manures; lime, plaster, salt, bonedust and mineral superphosphates as manures; circumstances under which each should and should not be used; times and modes of application; how to avoid the waste of such manures in the soil; their action on seeds and young plants; favourable and unfavourable action at different stages in the growth of crops; action of nitrates and ammoniacal manures on cereals, roots and grasses; special action of salt when used alone, and also in connection with other manures.

Night-soil and animal manures; combinations of manures for certain purposes; manures which impoverish the soil; quantities of manures to be used on various soils with different crops; general principles regulating the selection of manures.

4. *Tillage Operations.*—Deep and shallow ploughing, fall and spring ploughing, subsoiling, rolling, fallowing, etc.; advantages and disadvantages of each; preparation of land for different crops, as fall wheat, spring wheat, barley, oats, peas, and maize; differences in cultivation of light and heavy soils.

5. *Seed and Sowing.*—Quality of seed; importance of using clean and pure seed; effect of age on the character of crop, its rapidity of growth, and liability to disease; quantity of seed per acre; methods and depth of sowing; change of seed, why necessary.

6. *Roots.*—Cultivation of roots and tubers—turnips, mangolds, carrots, beets, and potatoes.

7. *Green Fodders.*—Oats and peas, tares, lucerne, sainfoin, prickly confrey, clovers, etc.; their comparative values; the management most appropriate for each; management of pastures.

8. *Rotation of Crops.*—Crops which each kind of soil is adapted to produce; succession or rotation of crops; importance and necessity of rotation; principles underlying it; rotations suitable to different soils, climates, and systems of farming in Ontario; their effects on the land.

9. *Drainage.*—Principles of drainage; effects on soil and subsoil; laying out and construction of drains.

10. *Exhausted Lands.*—Causes of exhaustion; how avoided; best means of restoring and enriching impoverished land.

11. *Breeding of Animals.*—Principles for guidance in stock-breeding; reproductive powers—how strengthened or weakened; pedigree influence—how intensified or reduced; loss of size in pedigree stock; how to control good or bad qualities; maintenance of constitutional vigour; common causes of barrenness in male and in female; special aptitudes of certain breeds for different conditions of soil and climate; principles which regulate special peculiarities, such as early maturity, rapid production of flesh, production of milk, growth of wool, etc.

Horses.—Most valuable breeds of horses for this Province; the leading characteristics of each; type of horse required for farm-work; breeding, feeding and general management; common diseases and their treatment.

Cattle.—Characteristic points—merits and demerits of Shorthorns, Herefords, Polled Angus, Ayrshires, Jerseys, Devons, Galloways and Holsteins; in and in breeding; breeding in the line; results of each system; milch cows—points of a good milk cow; general management; economy of good management; conditions affecting quantity and quality of milk. Common diseases and remedies. Dairy management.

Sheep.—Characteristics of different breeds; long-wooled, medium-wooled, and short-wooled sheep; crosses between different breeds compared; influence of breed, climate, food, soil, and shelter on the quantity and quality of wool—evenness, lustre, yolk, fineness of fibre, felting power, etc.; feeding; winter and summer management; management of ewes before, during, and after lambing season; rearing of lambs.

Swine.—Characteristics of the most important breeds of pigs; management of sows and stores.

12. *Food and Feeding.*—Composition and properties of the most important varieties of feed and fodder available to the Ontario farmer; classification of foods; chemical results in the use of different foods; "heat-producing" and "flesh-forming" ingredients in food; best methods of combining these in feeding, so as to secure desired results; points to be observed in order to obtain the full value of natural and artificial foods; increase of value by preparation of food; shelter and warmth as means of economising food; "good and bad systems of feeding."

13. *Diseases of Crops.*—When plants are most liable to disease; causes of disease; chlorosis; fungoid diseases, as bunt, smut, rust and mildew; remedies.

14. *Orchards.*—Planting, cultivation, pruning, grafting, etc.; best varieties of fruit-trees for different soils and climates of Ontario; diseases, and insect pests.

15. *Forestry.*—Planting and cultivation of forest trees, shade and ornamental trees, etc.

16. *Entomology.*—Common insects injurious to vegetation; their habits and the best means of checking and preventing their ravages.

8. That a special committee be appointed, with power to select books of reference, appoint examiners, and arrange details as to notice to be given by candidates, printing and numbering of examination papers, and all other matters necessary for carrying out the scheme.

CHARLES DRURY,
JOHN CARNEGIE,
GEO. W. BUCKLAND,
JAS. MILLS.

Speeches were made by Mr. Drury, Prof. Mills and Prof. Brown, on the subject of the Report, and it was laid on the table to be discussed to-morrow. The Council then adjourned.

Guelph, Wednesday, 25th April, 9 a.m.

The Council met pursuant to adjournment in the Council Chamber. A discussion took place on the management of the Exhibition.

Mr. Parker then presented the following Report:—

To the President and Members of the Agricultural and Arts Association:

GENTLEMEN,—The Executive and Building Committee to whom was referred the report of the Superintendent, beg to report that they have made a personal examination of the grounds and buildings of the city of Guelph, and find them in good order, with good buildings as far as they go. We have also examined the report of Mr. White, and agree that it covers the wants of the Board fully, with the additional pens that we have recommended him to fill in the report; which now enlarges the accommodation to 302 stalls for horses, 280 stalls for cattle, 184 pens for sheep, and 184 pens for pigs. With the above additions, we would recommend that the report of Mr. White be adopted by the Council, and that the Secretary be requested to inform the Mayor of Guelph of the requirements of the Council, in accordance with the said report.

All of which is respectfully submitted by

H. PARKER,
Chairman.

GENERAL SUPERINTENDENT'S REPORT.

To the President and Officers of the Agricultural and Arts Association of Ontario:

Gentlemen,—Having visited the grounds of the Agricultural Society in Guelph this day, for the purpose of reporting to your honourable body the necessary accommodation required for the purpose of holding your Provincial Show, beg leave to report,—

1st. That the grounds are very nicely situated, clean, and very convenient for visitors attending it. Also for exhibitors bringing stock, machinery, and other heavy articles to the show; a spur from the railway line running into the grounds, with platform erected for the purpose of unloading and reloading.

2nd. The main building is large, having four wings, 40 by 60 feet each, with a centre, 84 by 84 feet. Also a gallery above, all around which will have ample space for an art gallery and ladies' department. Another office inside will be required, similar to the one now there, for the Secretary of Arts.

3rd. I found 172 horse stables, thirty-six of which are wide stalls, all of which need to be floored, and berths made overhead for storing feed and for grooms to sleep. Also fence battening on back, which forms front of stables. I would say you will require fifty more wide stalls, 10 by 14 feet, and eighty more, 7 by 14 feet, making a total of 302, all floored and provided as aforesaid; and with proper mangers and feed boxes. The doors of all cut square across the centre, so as the lower one can be locked and the upper one left open when required to do so.

4th. I found one large cattle shed, containing 186 stalls, 10 by 12 feet, and another to the north of the pig pens, fifty-two stalls. You will require forty-two more, making 280 stalls.

5th. I found only eighty-four sheep pens, 6 by 6 feet each. You will require 100 more 8 by 10 feet each, the old and the new, each pen to be provided with troughs for feeding.

6th. I found only eighty-four pig pens 6 by 6 each. You will require 100 more 8 by 8 feet each; the old and new to be floored, and each pen provided with a trough for feeding.

7th. I found the poultry shed too small. I would recommend the closing up of the gate at the north end of the poultry shed, and removing said gate to the north corner of the Show-ground, opposite the railway landing: and lengthening the poultry shed as far north as the cattle shed. The poultry shed to contain 400 coops, which are now made; said coops to be repaired and cleaned for use.

8th. For the stove building I would recommend using one of the wings of the Palace, there being ample space therein.

9th. For horticultural hall a new building will be needed, 125 by 40 feet, with floor above and below; or twice the length, single storey, which we would recommend to be built on the north end of the Show-ground. Said building to be provided with necessary tables and railings as required.

10th. For carriages there is now a building on the ground, 96 by 24 feet, which can be repaired and used. There will also be required an additional building of 150 by 24 feet, for holding carriages.

11th. A new building will be required for hay barn and granary, 40 by 25 feet, including granary; with bins for holding oats, chop, etc., erected on one end.

12th. There will be required a small building for Superintendent's office, to be erected near the centre of the grounds, 16 by 24 feet, fitted as required by Superintendent.

13th. There will be required a new building for dairy, 60 by 30 feet. Would recommend it to be erected on the north end of the Show-ground.

14th. The building at the gate will need to be refitted for Secretary and Treasurer's office; and the building formerly used for a refreshment building fitted for the use of the members of the Board.

15th. The water supply I found good, and would recommend that a few cyphons be attached to the water-works, with taps for supplying drink to visitors.

There would also be required a tank or hole being dug and covered for the purpose of showing pumps ; location down in the flats, to prevent making grounds muddy. There would also be required two more cattle rings, making six in all. Water closets to be put in good repair, and an additional one built.

All of which is respectfully submitted.

I remain, your obedient servant,

A. H. WHITE.

April 23, 1883.

At this stage of the meeting the Council were waited upon by the local committees from the City Council and the South Wellington Agricultural Societies, the report of requirements as above was read to them, and after a brief discussion was unanimously adopted by them.

The Secretary was authorized to purchase a calagraph for use in writing pedigrees.

Mr. Aylesworth then read the following report :—

Mr. PRESIDENT,—Your Committee appointed to take into consideration the advisability of having a practical test of reapers and binders during the exhibition week at Guelph, respectfully recommend that the same take place at the Experimental Farm, on Friday afternoon at 3 o'clock.

The Government, on the suggestion of Prof. Brown, manager of the Farm, have kindly offered to provide a piece of grain of about ten acres for the testing of said machines.

Signed, J. B. AYLESWORTH.
J. LEGGE,
J. HUNTER.

Guelph, April 25, 1883

The Educational scheme laid over yesterday, was then discussed, and on motion of C. Drury, seconded by Henry Parker, was carried unanimously ; and on motion of Ira Morgan, seconded by J. Legge, Messrs. Drury, Carnegie, Prof. Mills and Prof. Buckland, were appointed a committee to put it in action. The prize list was then taken up, and as much as possible was amended, the rest to be finished by a committee to meet at Toronto at an early date. The Finance Committee reported that they had passed the accounts rendered to date, and the meeting then adjourned.

Guelph, August 22, 1883.

Meeting of the Executive Committee at the Wellington Hotel.

Members present.—Henry Parker, Chairman ; D. P. McKinnon, Geo. Moore, J. B. Aylesworth, L. E. Shipley, also Geo. Graham, Treasurer, and H. Wade, Secretary.

The Committee visited the grounds and inspected the buildings ; the booths were auctioned by the treasurer, and during the day were disposed of. At the meeting in the afternoon, it was decided to allow Prof. Brown, of the Ontario School of Agriculture, the two cattle sheds at the north end for their cattle for the sale. It was also moved by Geo. Moore, seconded by D. P. McKinnon, and resolved, That the Association grant the sum of eight hundred dollars to the Local Committee of the city of Guelph towards lighting the Grounds during the Exhibition with electric light, and the holding of a band tournament on the Grounds during the evenings of the show. The Committee were well pleased with the advanced state of the buildings.

The next meeting of the Council took place in the city of Guelph, on the 22nd of September, the Saturday previous to the opening of the Thirty-eighth Provincial Exhibition, at their Board-room on the grounds, at 3 o'clock p.m.

Members present.—D. P. McKinnon, President; Messrs. Legge, Snell, Moore, Parker, Shipley, Morgan, Aylesworth, and the Secretary.

The minutes of the last meeting held in Guelph were read and adopted.

A communication was read from W. P. Lett, the Clerk of the City of Ottawa :—

To the President and Directors:

Gentlemen,—I have been instructed by the Council of the Corporation of the City of Ottawa to request you to hold your next Provincial Exhibition at the city of Ottawa, and to assure you that if the city is favoured with the Exhibition the Council will do everything in their power to make it a grand success. Letter laid over.

The Secretary explained that he had invited his Honour the Lieutenant-Governor to open the Exhibition, and he had been pleased to accept; and had notified him that he would be up on Wednesday the 26th, at 2 o'clock p.m.

Moved by Ira Morgan, seconded by L. Shipley, and resolved, That the President, D. P. McKinnon, Messrs. Carnegie, Moore, Aylesworth, and the Secretary, be a committee to draft an address to his Honour, and adopt what means they think necessary for his reception and entertainment.

It was resolved, That the Mayor and Council of the city of Guelph, and the Directors of the South Riding of Wellington Agricultural Society, be given badges of admittance to the Exhibition; also, that the school children be admitted on Wednesday and Friday at a reduced rate.

It was resolved, That the council meetings for the coming week be at 10 a.m. and 3 o'clock p.m.

Meeting adjourned.

Monday, September 24, 1883, 10 a.m.

Council met at Board-room pursuant to adjournment.—All the members present.

Mr. Carnegie submitted a copy of the address to the Lieutenant-Governor, which was accepted, and a copy ordered to be engrossed for presentation.

It was resolved, That Messrs. Drury, Aylesworth and Moore be a committee to take charge of the trial of self-binding reapers, and to make all the arrangements necessary for properly conducting the same.

Meeting adjourned until 2 o'clock. The President in the chair. The following letter was read :

September 22, 1883.

Henry Wade, Esq.,
Secretary Agricultural and Arts Association, Guelph.

Dear Sir,—Referring to the proposed field trial of binders on Model Farm during Provincial Exhibition, the manufacturers met in Toronto this week, and decided that such a trial would only cause unnecessary trouble and expense, and accomplish no good end. They have, therefore, decided that none would go. Will you, therefore, please notify the public, through the press in London, that for above reasons there will be no trial.

Yours truly,

Jas. Kerr Osborne.

Moved by Mr. Carnegie, seconded by Mr. Moore, That with reference to the communication of Mr. Jas. Kerr Osborne, of Brantford, addressed to the Secretary, and informing him that the manufacturers of self-binding reapers had held a meeting in Toronto, and had decided not to enter their machines for competition at the proposed field trial of the same, advertised to take place at the Model Farm on Friday next, the

public press be requested to state that such trial having been duly advertised, and the Model Farm having grown a field of grain for this special purpose, this Council is determined, so far as it is in their power, to carry out the said trial, and that, although they are aware that some manufacturers are endeavouring to prevent such a trial from taking place, they have reason to believe that the efforts of the manufacturers represented by Mr. Osborne will prove abortive, and that the owner of more than one self-binder has sufficient confidence in the merits of his machine to submit it to public inspection at work along side of its rivals. Carried.

Meeting adjourned.

Tuesday, Sept. 25th, 1883, 10 *a.m.*

Council met ; all the members present. The Judges were notified to meet at two o'clock to commence work in all the classes that were ready.

A communication from the Hon. James Young was read in reference to the unsettled account *re* Agricultural Hall. Moved by J. B. Aylesworth, seconded by Mr. Rykert, and resolved, That Messrs. Drury, Carnegie, Parker, and the President be a committee to confer with the Commissioner of Agriculture in reference to his communication.

It was ordered that all horse stalls not occupied at eleven a.m. to-day be allotted to others requiring them.

Afternoon Session.

It was resolved that class 35, agricultural implements, be referred to a committee, consisting of Messrs. Drury and Aylesworth.

Meeting adjourned.

Wednesday, 26th September, 10 *a.m.*

Council met, and were busy starting judges in their different classes. The President and some members of the Council, with the City Council, took the Lieutenant-Governor and party to a lunch, provided at the Ontario Experimental Farm.

At two o'clock p.m. the Official opening of the Thirty-eighth Provincial Exhibition took place on the Grounds.

The President's address of welcome was read by the Secretary, and was as follows :—

To His Honour, John Beverley Robinson,

Lieutenant-Governor of the Province of Ontario.

May it Please Your Honour :

We, the President and members of the Council of the Agricultural and Arts Association for the Province of Ontario, desire to express the gratification afforded us by your Honour's consenting to open this, the first Provincial Exhibition held in the royal city of Guelph, and the thirty-eighth successive annual exhibition held under the auspices of this Association.

Great and manifest has been tho advancement of that part of the Dominion now constituting the Province of Ontario, during the last thirty-seven years, in all that contributes to render a people intelligent, prosperous, and happy. Among no class of the community has that progress been greater than among those engaged in agricultural pursuits. And we venture to think that this result has been contributed to in no mean degree by the exhibitions held under the auspices of the Association, and by the other means it has adopted from time to time to promote the interests especially committed to its care.

To those, unfortunately now few and far between, who can go back in mind to the first Provincial Exhibition, held in Toronto thirty-seven years ago, the changes which have taken place must seem almost marvellous, and have been far beyond the most sanguine anticipations of those days. Then a thorough-bred animal of any kind was the exception. Now thorough-breds are not only to be found in almost every local municipality, but on this Show-ground are to be found numerous—too numerous for our accommodations, extensive as they are—representatives of every important breed of domestic animal; whilst among their number—as a result of the private enterprise, stimulated and fostered by such gatherings as these—are to be seen the best animals of their kind to be found, perhaps, in the world.

Thirty-seven years ago, with the sickle and the cradle, our harvests were literally reaped by the sweat of the brow; now, thanks to the intelligent and inventive skill and the enterprise of our merchants, the laborious sickle and cradle have disappeared before the reaper; while the latter is now being displaced by a combination of mechanism which not only cuts but binds our grain.

There are examples, but only two out of the many, which might be cited as proof of the great progress which Ontario Agriculture has made during these thirty-seven years; and we venture to think it is a record of which the people of this Province has a right to be proud, and which should stimulate them to even greater efforts in the same direction.

The farmer's calling is, or should be, one of continual progress: and with a view of stimulating that intelligent enquiry into the why and wherefore of things—from which all true progress springs—this Association begs to inform your Honour that they have decided to inaugurate a scheme of annual examinations in subjects pertaining to agriculture, somewhat similar to those already in progress in England and Scotland, in the hope that they may be the means of inducing young men, engaged in the active work of the farm to devote a portion of their time to that continued advancement in Canadian agriculture which is so essential to the continued growth and prosperity of both this Province and the Dominion.

HENRY WADE, *Secretary.* D. P. McKINNON, *President.*

Guelph, September 26, 1883.

His Honour then replied as follows:

To the President and Members of the Council of the Agricultural and Arts Association of the Province of Ontario.

GENTLEMEN,—It has afforded me much pleasure to be able to accede to your request to open the first Provincial Exhibition held in the royal city of Guelph.

The rapid advance of which you speak, in all that apertains to agriculture, throughout this Province, nowhere more marked than in this country, is indeed most gratifying; telling, as it does, of the future greatness of this Province.

To those, alas now too few, who can remember the first Provincial Exhibition, held in Toronto, the vast changes to which you allude must indeed appear marvellous.

What satisfaction it must be to the remaining founders of your Association to know, while the contrast the first meeting with the present grand display, that they have contributed so largely to this great result, and pointed out a path, which, cultivated by such gatherings as these, has made this Province what we see it to-day—famous in many lands for its agricultural products, and its thorough-bred herds of cattle, horses, and sheep. All honour to those men; their names should never be forgotten in a country for which they have done so much.

It is gratifying to hear you say that the enterprise and skill of our mechanics and manufacturers have kept pace with the agriculturalist, relieving him greatly from the toil and trouble of former days, jointly and together, making a record of which the people of this Province may justly feel proud.

I learn with pleasure that your Association has decided to inaugurate a scheme of annual examination in subjects pertaining to agriculture, somewhat similar to those already in vogue in England and Scotland; and trust that your anticipation of benefit to the young farmer may be fully realized.

The Dominion of Canada, with its vast agricultural resources and enterprise, is attracting the attention of many abroad, who live by the cultivation of the soil. We have ample room for millions yet to come.

As these make their sojourn here, I hope they may find, thanks greatly to the stimulus given by the exertions of your Association, that the native-born Canadian farmer, upon whose industry and intelligence the future welfare of our country so greatly depends, is in no way inferior in agricultural knowledge, thrift, and management to those who may come to share, in the early future, our great inheritance.

His Honour then briefly declared that the Thirty-eighth Provincial Exhibition was open.

Thursday, September 27, 10 a.m.

Council met and attended to protests; the same at afternoon session; and again at eight o'clock in the evening, at which a number of extra prizes were awarded. They will be found in the official prize list in this report.

A letter was read from Henry Anderson, the late Superintendent, asking the Council for a silver medal for long services, which was granted.

Moved by Mr. Moore, seconded by Mr. Snell, and resolved, That the President, Messrs. Parker, Carnegie, and Drury, be a committee to settle the claim of the Ontario Government *re* Agricultural Hall: or failing a settlement, to arrange for an arbitration; also, that the committee be authorized to pass such accounts as they think proper, without reference to the Council, and to meet shortly at Toronto.

Meeting adjourned.

Friday, September 28.

Council met as usual. A number of diplomas and medals were awarded. The weather being very cold and wet, it was arranged to hold a meeting of the Council at the Wellington Hotel, at eight o'clock. At that hour the President took the chair. Messrs. Legge, Aylesworth, Parker, Snell, Moore, Carnegie, Shipley and the Secretary, were present.

Mr. Drury reported that the share of gate receipts due the Provincial Grange was two hundred and ninety-eight dollars. On motion this amount was ordered to be paid. After some other detail business, a very pleasing testimonial was handed in by the exhibitors of the main building, which read as follows:—

GUELPH, *September* 29.

To ERASTUS JACKSON, Esq.,
Superintendent of Main Buildings, Provincial Exhibition, Guelph.

DEAR SIR,—As the time of the closing of the Provincial Exhibition draws near, we, the undersigned exhibitors, cannot allow it to pass without acknowledging your many kindnesses. Your genial, hearty manner has affected your whole staff, so that work has been pushed through, business facilitated, dull care driven away, and the remembrance of our relations together will long remain in our minds in pleasant retrospect.

Allow us to return our thanks to yourself and Mr. Kay, Secretary of the Arts Department, for not only discharging the duties of your respective offices to our more

than satisfaction, but also with such tact and kindness as is rarely met with in business associations.

On behalf of exhibitors,

James Clarke, for John M. Bond & Co., representing thirty-seven manufacturers.
Q. R. Cooke, for The J. H. Stone Manufacturing Co., Hamilton.
Thomas Dunn, for Risley & Kerrigan, Toronto.
Isaac Anderson, Manufacturing Superintendent Queen City Oil Co.
Christie, Brown & Co., Toronto.
Paul Kelly, representative of Bryce Bros. Climax Refrigerator, Toronto.
Withrow & Hillock, Toronto.
Chas. Raymond, Sewing Machine Co., Guelph.
C. A. Fleming, Principal Northern Business College, Owen Sound,
W. D. Hamilton, for Singer Manuf'g Co.
Mrs. Wm. Ker.
C. C. Pomeroy, for Wheeler & Wilson Manufacturing Co.
Rainer, Sweetnam & Hazleton, Piano Manufacturers.
W. Bell & Co., *per* J. C. M. T.
Md. Dubois & Fils, L. Dubois, Toronto.
N. P. Benning, Paris.
F. W. Unitt, Toronto.
J. E. Taylor, Toronto.
T. S. Aspinall & Co.
T. James & Co.
Geo. McBroom.
W. H. Marcon.
London Feed Co.
Miller Bros. & Co.
The Chippawa Tannery Leather Belting Co., Chippawa, Ont.
Joseph Hopkins.
McCrae & Co., *per* Wm. H. Naylor.
Mr. Joseph Cartledge, *per* Wm. H. Naylor.
P. Worden, *per* Wm. H. Naylor.
Petley & Petley, Toronto.
Authors & Cox.
Jos. A. Tovell.
Wm. Russell.
Iredale & Hickerson.
E. & C. Gurney Co., *per* Van Taigh.
Gurney & Ware, Scale Manufacturers.
Burrow, Stewart & Milne, *per* M. H. Oliver.

After the business was over, the Mayor and a number of the Council of the city of Guelph waited on the Board, and a sort of mutual admiration society meeting was held, short speeches being made by every one.

Meeting adjourned.

Saturday, September 29, 10 o'clock a.m.

Council met. Members present.—Messrs. McKinnon, President, White, Aylesworth, Legge, Snell, Shipley and Moore.

At this meeting several accounts were passed, and the meeting adjourned, to meet in Toronto on the 13th of December next.

The Secretary and Treasurer were busy all day paying out premiums.

ANNUAL MEETING OF THE AGRICULTURAL AND ARTS ASSOCIATION OF ONTARIO.

This took place at the Council Chamber of the City Hall, on the evening of Wednesday the 26th of September, at 8 o'clock p.m., D. P. McKinnon, President, in the chair.

The Secretary, Mr. Henry Wade, then called the roll; first the members of the Council, then the delegates from the various societies; the following gentlemen answering to their names, viz.:—

Members of Council.—District No. 1, D. P. McKinnon, South Finch; No. 2, Ira Morgan, Metcalf; No. 3, Joshua Legge, Gananouque; No. 4, J. B. Aylesworth, New-

burgh; No. 5, John Carnegie, M.P.P., Peterborough; No. 6, J. C. Snell, Edmonton; No. 7, G. Moore, Waterloo; No. 8, J. C. Rykert, M.P., St. Catharines; No. 9, Henry Parker, Woodstock; No. 10, Joseph Hunter, Eden Grove; No. 11, L. E. Shipley, Greystead; No. 12, Stephen White, Chatham; No. 13, Charles Drury, M.P.P., Crown Hill.

Ex-Presidents.—Thos. Stock, Waterdown; F. W. Stone, Guelph.

Delegates from Agricultural and Horticultural Societies.—Addington, D. A. Burdett and H. W. Casey; Algoma, Wm. Saunders; Bruce North, Wm. Scott; Cornwall, Samuel Wood; Bruce South, James Tolton, Robert Gowanlock; Durham West, Levi Van Camp; Frontenac, John Simpson, Joseph Walkelm; Halton, Alexander Waldie; Hastings East, G. M. Caldwell, Thomas Martin; Huron West, Wm. Varcoe, John Varcoe; Huron South, Hugh Love; Kent East, R. Lancaster, John Balmer; Kent West, Samuel Glenn, John Paxton; Lambton East, Leonard Huffman; Lanark North, Andrew Wilson; Lennox, Benjamin Briscoe, Jr., John Sharp; Leeds South, John Cook; London, Thomas Partridge, Charles Taylor; Middlesex West, James Healey; Middlesex East, John Kennedy; Middlesex, Henry Anderson; Monck, Hugh Crawford; Niagara, Joseph Walker; Norfolk North, Oliver Jarvis; Northumberland East, Anthony Terrill; Northumberland West, James Barnum; Oxford North, Wm. Donaldson; Oxford South, James Ryan; Peel, Alex. Armour, Luther Cheyne; Perth South, J. T. Wright; Perth North, Jas. Ballantyne; Peterborough East, James Moore; Peterborough West, Samuel McKibbon, Joseph Walton; Prince Edward, N. O. Peterson, Benjamin Storey; Renfrew North, Jas. Park, Edward Bulmer; Renfrew South, Geo. B. Cardiff, Thomas Barr; Russell, Judge Daniel, Robert Cummings; Simcoe South, R. J. Bunting, John Ross; Wellington North, Walker Turner, John Main; Wellington South, Richard Bird, Thomas Waters; Wellington West, John Drummond; York North, E. Semlary, E. Jackson; York East, Thomas Hood, Alex. Pringle.

Horticultural Societies.—Brantford, J. B. Hay; Owen Sound, John Mills; Goderich, Charles Blake; Berlin, John S. Huffman; Palmerston, W. Quenell.

The President then read the following address:—

PRESIDENT'S ADDRESS.

Gentlemen,—The return of another annual meeting of the Agricultural and Arts Association, imposes upon your President the task of delivering an address, and I avail myself of this privilege of addressing you, to call your attention to matters which appear to me to be of importance to the great agricultural interests of Ontario.

We rejoice in the continued prosperity of our farmers, and, as a natural consequence, in the prosperity of all classes of our people, as it is now pretty generally conceded on all hands, that the prosperity of the country depends mainly upon the success attending the labours of the husbandmen. The harvest is now completed, and while in some localities there are complaints of failure, yet on the whole, with the exception of fall wheat, there is reason to believe that the results of the year's operations will be satisfactory.

It is with great satisfaction that I refer to the continued development of the export trade in live stock with the motherland; everything seems to point to the permanency of this trade, and it should be a matter of prime concern with our people and Government, to guard it from any drawbacks. It must be remembered that this Dominion possesses a climate unsurpassed anywhere in the world (and I might even say it is doubtful if any other country possesses so healthy a climate) for the preservation of the health of our flocks and herds. A traveller in Europe will find almost everywhere traces of those troublesome and distructive diseases, which occasionally break out with serious results. How is it with us? Positively no disease has yet found a home among our flocks and herds.

The country was startled a few weeks since, by a despatch from England, that foot and mouth disease had broken out in a cargo of Canadian cattle; although I believe it was found that the disease had not been brought from a Canadian port, yet the alarm created by the despatch referred to, shows how serious a matter it is considered by the

people of Ontario. It is our duty to urge upon the Government the necessity of adopting the most stringent measures to prevent the introduction of those diseases known to exist at the present time in the United States.

It is manifest that the interests injuriously affected by the importation of cattle and other stock into Great Britain are only awaiting an opportunity to compel the slaughtering of our cattle at the port of debarkation. This would mean the loss of a large amount of money to our farmers, and the destruction of the vantage ground held by us over other countries at the present time.

It is pleasing to note the improvements in the class of animals now offering for the export trade in Ontario. The high price has induced a general effort to improve the breed by the use of well-bred bulls, and although much yet remains to be accomplished in this direction, the progress already made cannot fail to be of immense advantage to the country.

At the last session of the Ontario Legislature, an Act was passed to encourage the planting of trees on public highways, by granting by way of bonus, a sum not exceeding twenty-five cents per tree, to parties planting such trees on highways and boundary lines. This sum is paid out of the funds of the municipality choosing to take advantage of the Act, and one-half the sum so paid is recouped to the municipality by the Provincial Government.

This is a step in the right direction. It is well known that many parts of the country are almost entirely stripped of its timber, and should this course be continued for a few years longer, we may expect to suffer the evil consequences experienced by other countries, as the result of the destruction of their forests. This subject is dealt with in a very able and practical manner by Mr. Phipps, of Toronto, whose pamphlet should be in the hands of every owner of land in the Province.

I may express the hope that there will be a general endeavour to beautify our roads and farms, by taking advantage of the Act, at least in all the older parts of the country.

I desire to call your particular attention to the Educational scheme, now prepared by the Council of the Association, and ready to be put into operation the coming year. I will first describe the scheme and the manner in which it is proposed to carry it out, and then give what I think are good reasons, why this effort should be cordially received by those in whose interests it is desired.

A course of study has been prepared, and text-books designated, or rather recommended, in practical agricultural subjects. An examination on these subjects will be held at the same time and place as the usual Departmental examination for teachers, and it is supposed that those who intend to go up for this examination (which takes place in July) will avail themselves of the comparatively leisure period of winter to take this course of reading.

The examination papers will be prepared by gentlemen of ability, and submitted to two members of the Council for approval. They will then be handed over to the Department of Education, and transmitted with the other papers prepared for candidates for the Intermediate and Teacher's Examination, to the presiding examiners in the several counties of the Province.

Notices of the dates of the examination will appear in the local papers throughout the country. Upon the completion of the examinations, the papers will be returned to the Department at Toronto, to be handed over to examiners appointed by the Council of this Association, who shall examine and mark the papers, and recommend the successful candidates for certificates.

It will be seen that, by permission of the Minister of Education, we are enabled to carry out our scheme with the same safeguards as to secrecy, etc., as now obtains in reference to papers prepared and sent out by the Education Department.

A large number of circulars containing full particulars are now being distributed through the country.

And now permit me to say a few words in reference to the benefits to be derived from this scheme. There was a time when many people thought that the calling of a farmer could be as successfully carried on without education as with it; and we have all heard instances cited of successful farming operations being carried on by men who

could neither read nor write. That there are such instances cannot be denied. At the same time, it is, I think, quite evident that in even these cases education would have helped them to a more speedy and perhaps less laborious realization of success.

Our public school system in this Province is, perhaps, second to none in the world. We are all proud of it and of its results in the general dissemination of at least a moderate share of education among the great masses of the people. Very few farmers' sons are now without the means of obtaining a share of what is available in the way of education, and the question may be asked: What more is required? I contend that as the lawyer, the doctor, etc., requires a special training to fit him for the avocation of his choice, so the farmer needs a special training in his calling, if the best results of which he is capable are to be obtained. The Government of Ontario, as well as the Governments of many other countries, recognizes this fact in the establishment of agricultural colleges and experimental farms, where the students are specially trained and educated in matters pertaining to the pursuit of agriculture. The fact that the people of this Province, through its Legislature, freely grants a large sum of money annually to carry on the operations of the college and farm in the neighbourhood of this city, is sufficient proof that the great majority of the people favour the expenditure, and are convinced that the country gets value for the money.

But it must be remembered that comparatively a small number only of the rising generation who intend to devote their lives to farming are able to attend the College, and the object and aim of the Association is to induce the young men of the farming community to engage in a course of reading at their homes, by which they may obtain a knowledge of the laws of nature, and of the reasons of their operations in practical husbandry.

I have said that in a financial aspect the man who is trained in the knowledge of his calling has a position of advantage over one who is not so trained, but this is only one of many advantages. True! we all like to feel that our business, whatever it may be, is profitable to us, but the accumulation of money should not be (as it too often is) the great aim and end of existence. How much more pleasure there is in the life of the farmer who *intelligently* adopts certain means to secure certain results, whose actions are guided by his knowledge of the laws of nature, and whose mind has been expanded and strengthened by study, than in the life of him who while employing certain means to secure certain ends has no knowledge of the laws governing his operations. No man should be content to be a mere machine, he should be able to find a source of pleasure in his calling, and I know of no better way to attach the young man of active and clever mind to the pursuit of farming, than by showing him that as a farmer his mind may find active and pleasurable employment in his pursuit. I have only to add that I sincerely trust that our efforts in this direction will meet with a hearty response.

We all feel proud of the progress made by Ontario in the lifetime of our Association. We have four times the population of forty years ago; three times the area of occupied land; and nearly seven times the area of land under cultivation. Within that period our system of husbandry has undergone a revolution. Great improvement is noticeable in the tillage of the soil. To drain well and to manure well are regarded as essentials of good farming. Labour-saving implements are in use everywhere, of kinds never dreamed of by our fathers here or in the old world. A much larger variety of crops are grown for home and foreign markets. Our dairy interests have been wonderfully developed, and a large foreign trade in animals and animal products has been built up. The introduction of improved breeds of live stock may be said to have followed the forming of our Association, and perhaps in no other department of agriculture has the Association exercised a better influence. These annual exhibitions have been so many schools for the education of farmers, and the display of products, live stock, and implements has had, I have no doubt, a more beneficial effect than the spirit of competition worked by our prize system. Every observant man who spends a day, or two or three days, in looking through the exhibits is sure to carry home some ideas that will be valuable in the practical work of the farm.

But it must be confessed that a good deal remains to be done before it can be said that farm culture has reached a good or satisfactory status. There are after all not many

farms in the Province of which more might not have been made. Let any man look through his own township and see how many, or rather how few homesteads there are which may be said to be well tilled, fenced, and stocked, with suitable buildings, and free from noxious weeds. I am not sure, but it is a fact, that there is not on an average, one farm in each township in the Province, the owner of which has conceit enough of it to enter it in competition for the premiums for "best farms," which our Association annually offers, and I think that the great fault of our farmers, the one generally noticeable, is the neglect to subdue and destroy noxious weeds. This year has been exceptionally favourable for weeds; for while the heavy and frequent rains of early summer promoted a rank growth, farmers were unable for want of time to keep them in check, but this good result may follow—that greater attention is called to these pests of the farm, and that the necessity for more repressive measures will be forced upon the country.

We have had for about fifteen years a special Act in the Statute books of the Province, to prevent the spread of Canada thistles. The provisions of that Act seem to be stringent enough, but no one will venture to say that the object has been obtained. The Act has *not* prevented the spread of Canada thistles. On the contrary their area is extending every year, and farmers almost begin to despair of the contest with so pertinacious an enemy. They say that the Act is a failure, and that it is folly to think of fighting Canada thistles by legislation. They tell you that the only way to destroy these thistles is to adopt a thorough system of tillage. If the infested land is well summer fallowed and then seeded liberally with clover, the thistle will be choked out. The method is an excellent one, but unfortunately every farmer cannot be pursuaded to adopt it, and one careless man can grow enough thistles in a season to seed a whole township. I am convinced that to meet such a case as this—and it is far from being a rare one—legislation of some kind is essentially necessary. The great defect of the present Act is in the machinery for enforcing it. The overseers of highways are good enough men for their special work, but it was a mistake to place on them the duty of putting the thistle statute in motion.

The reason is obvious; no man can be expected to prosecute his neighbour for a general offence. It seems to me that the Act for preventing the spread of Canada thistles can only be rendered effective by entrusting the duty of its enforcement to some person who will not be hampered in his work by considerations of a personal character. One inspector for the whole township would answer the purpose much better, and it should be imperative on every municipality to appoint such an officer.

I would also respectfully suggest to our legislators the importance of enlarging the scope of the Act. There are other weeds, such as wild oats, oxeye daisy, pigeon weed, wild mustard and others almost as hard to cope with as the Canada thistle itself. These are spreading rapidly throughout the country, and if not dealt with speedily, they will in a short time get beyond control. We need good tillage to exterminate them, but we also need some wholesome and thorough legislation to reach the negligent farmer; no man should be permitted to use his land for the propagation of noxious weeds.

During the past year the Council of our Association has endeavoured to awaken an interest in all matters pertaining to agriculture, by the employment of various means found effectual in other parts of the world.

The interest in the competition for prizes offered for the best managed farms has been well sustained, and the valuable reports prepared by the judges have been widely read. The report and award of the judges will be made at the meeting to-night, and the names of the successful competitors made known.

Prizes of the value of $200.00 have been offered for essays on subjects of great practical importance; $100.00 of which is contributed by the Provincial Government. I am informed that an unusually large number have been sent in, and no doubt possess great merit, and will be published in the Annual Report.

I would venture to suggest to the Council of our Association the advisability of employing a competent gentleman to deliver a series of lectures throughout the country, upon agricultural subjects. This has been found of great value in arousing interest in other countries and there seems no reason why it should not be successful here.

You will no doubt have observed that our Association, in conjunction with the

Toronto Electoral District Agricultural Society, has arranged for the holding of a Fat Stock Show at the City of Toronto on the 14th and 15th days of December next. Our able and energetic secretary, Mr. H. Wade, was last year sent as our representative to the Chicago Fat Stock Show, and on his return laid, before the Council a full report of his observations, and strongly recommended the inauguration of a Provincial Fat Stock Show, to be held annually at the City of Toronto. Upon this report the Council took action, contributing one-half of the funds, and appointing three of its members, with the Secretary, on the joint Committee of Management. The prize list amounts to nearly $1,200.00, and we have every reason to believe this new departure will be abundantly successful.

A large sum has been set apart for ploughing matches, to be held in various parts of the Province the present year; the Council believing this expenditure to be a judicious one.

In conclusion permit me to say that during the past year we have endeavoured to enter every open door of usefulness, to observe the strictest economy in the running expenses of the Association, and to make the best possible use of every dollar entrusted to us by the liberality of the Legislature.

Signed, D. P. McKinnon,
President.

Moved by J. B. Aylesworth, Esq., of Newburgh, seconded by Ira Morgan, Esq., of Metcalf, that the thanks of the meeting be given to the President, D. P. McKinnon, Esq., for his very able address.

Mayor Chase, of Guelph, kindly put the motion and it was carried unanimously.

Mr. Drury, in a few well-chosen remarks, then explained to the meeting that the delegates had not, as formerly, the power of voting for the next place of holding the Exhibition. The Council would, however, be glad to have expressions of opinion, both as to the propriety of continuing the Exhibition for another year, and holding it in any particular place. An official invitation had been received to hold it in Ottawa next year. Would be glad to hear a general discussion on the subject.

Mr. Carnegie explained that the Council had to decide by the 15th of December whether they ask for the grant or not.

Mr. Aylesworth also said he would be pleased to hear the opinion of the meeting.

Thomas Stock, Esq., of Waterdown, in a short and forcible speech, spoke of the good done by the Provincial Exhibition, and moved that the Council ask the Government to supply the usual grant for holding the annual Exhibition, and that such be held next year. Also, that the thanks of the community be tendered to the Council for their admirable management.

This was seconded by Mr. Clark, of Ottawa.

Mr. Cummings, of the county of Russell, spoke in favour of the perambulating system.

The President thanked the audience for their appreciation of his address, and explained that it seemed a little anomalous that they should be congratulating themselves upon having the best and largest show of live stock that had ever been held on this continent, and that at the same time they should have to ask the assembly whether they were to continue or not holding exhibitions. For his part he heartily agreed with the audience, that they should continue the Provincial, and let the farmers see that one exhibition at the least could be carried on in the old fashioned way, without teaching their children horse-racing, etc. A great many farmers would not allow their sons to go to a horse race, but they could go to an exhibition, and see them and other special features just as objectionable.

It was then moved by John Carnegie, Esq., M.P.P., seconded by Ira Morgan, Esq., and resolved, That a vote of thanks be offered to the Mayor, and Council, and Local Committee of the city of Guelph for their valuable aid to the Association in holding the present exhibition.

Mayor Chase responded in a suitable manner.

The Secretary then read the report of the Judges on Prize Farms, in group No. 4 consisting of the following counties, viz :

Peel, Cardwell, York North, York East, York West, Simcoe West, Simcoe East, Simcoe South, Algoma, Muskoka and Parry Sound, Ontario North, Ontario South, Durham East, Durham West.

Award of judges appointed to inspect farms entered for competition in Group Four : Gold Medal.—Simpson Rennie, Milliken P.O. First Silver Medal.—Wm. Rennie, Toronto P.O. Second Silver Medal.—David Smellie, Concord P.O. Bronze Medal.—Thomas J. Black, Brampton P.O. Bronze Medal.—Wm. Robinson, Stayner. Bronze Medal.—Albert Tamblyn, Orono P.O.

JOHN I. HOBSON, } *Judges.*
WM. DONALDSON, }

REPORT OF PRIZE FARM COMPETITION IN GROUP NO. 4.

The District in which the competition for farm prizes took place this year was Group No. 4, comprising the counties of Cardwell, Peel, York, Ontario, Durham, Simcoe, and Muskoka and Algoma.

The instructions we received were the same as those given to the judges who carried out similar work during the past three years, but for the benefit of those who may not have seen former reports it may not be amiss to state them again.

In addition to any other points that may be thought desirable by the judges, the following shall be taken into consideration in estimating what is "the best managed farm."

(1) The competing farm to be not less than one hundred acres, two-thirds of which must be under cultivation.

(2) The nature of the farming—whether mixed dairy or any other mode—to be the most suitable under conditions affected by local circumstances.

(3) The proper position of the buildings in relation to the whole farm.

(4) The attention paid to the preservation of timber, and shelter, by planting of trees.

(5) The condition of any private roads.

(6) The character, sufficiency and condition of fences ; and the manner in which the farm is subdivided into fields.

(7) Improvements by removal of obstacles to cultivation, including drainage.

(8) General condition of buildings, including dwelling-house, and their adaptability to the wants of the farm and family.

(9) The management, character, suitability, condition and number of live stock kept.

(10) The number, condition and suitability of implements and machinery.

(11) State of the garden and orchard.

(12) Management of farm-yard manure.

(13) The cultivation of crops, to embrace manuring, clearing, produce per acre in relation to management, and character of soil and climate.

(14) General order, economy and water supply.

(15) Cost of production and relative profits.

Having been notified of our appointment we arranged to begin our work on the 2nd of July. The owners of the different farms entered for competition were in the meantime written to inform them of the time we would likely be at their respective places.

Owing to the death of a near relation of one of our judges on the morning previous to our arranged meeting, we were unable to carry out our plan. And not being able to communicate with each other before the trains left in the morning, nothing else could be done than to meet as agreed, and to set another day for commencing. Accordingly the work was put off for a week, the different parties were again written to, informing them

of the change, and we met the following Monday morning in Brampton, and drove out to the farm of Mr. Thos. J. Black—going by the way of Huttonsville through a fairly well-farmed section.

MR. THOMAS J. BLACK'S FARM.—BRONZE MEDAL.

This farm is situated on the fourth line of the township of Chinguacousy in the county of Peel, four miles from Brampton on the Brampton and Milton road. It comprises 270 acres, consisting of two separate farms with a full set of buildings on each. The nature of the soil on a large part of the farm may be termed sandy, the balance partly clay loam, and a small portion sandy loam. The whole farm is underlaid with a very free subsoil. As might be expected from the nature of the soil and the wetness of the season, on well-tilled land the crops looked remarkably well. Haying had been commenced the week before and a considerable quantity had been housed in fairly good order (weather considered). A quantity of clover, which was partly cured, had got the heavy rains of the Saturday previous and was badly discoloured. On the day of our visit hay making was going on lively. One field of heavy clover was being rapidly cut down by a son of Mr. Black's with a pair of very fine horses. Another was at work in an adjoining one with a horse rake, and a set of men with two teams were busily drawing into the barn from a third. The work all proceeding in that smooth, systematic style which plainly denotes the good manager, and in itself is sufficient to often account for the reason why one man on a large farm will succeed without doing much of the hard work himself, and yet make money, and another on a similar one may work like a slave and not get much ahead. In fact it is a question whether a farmer on a large farm can afford to take hold of the ordinary farm work at all, and whether it is not much more to his advantage to keep a close personal supervision over the whole business of the farm, and devote his time to seeing that everything is running smoothly.

Mr. Black's farm was originally timbered with pine, and before it was brought into its present shape required an expenditure of from $25 to $40 an acre for stumping. So many stumps were on the land that after a large quantity were burnt, enough were left to fence the whole of the farm on which he is now living.

We may remark that these pine stump fences to some people may look rough, but from our way of looking at it we think, when they are properly built, that it is the best possible thing to do with them, and on a pine farm seems an easy way for the owner, as far as he is concerned, to solve the problem, "what is to be the fence of the future."

Mr. Black has not only made use of them for fences, but gate-posts as well, and whatever others may think of the idea who have not seen it carried out, we would pronounce the plan an excellent one. When it is seen not only does it look all right, but as Mr. Black remarked, there is no trouble with the gate-posts heaving. Of course this is to be borne in mind, that although there was nothing clumsy or awkward-looking about it, as the work had been carried out by Mr. Black, yet if it was done by one of those sort of men who never do anything right, it would be a rough-looking affair, all depends on *how* it is done.

What has been said about the stump fences only refers to the fields, the small enclosures around the buildings being all fenced with neat straight fences, and those around the house and garden nicely painted. The fences on the other farm are mostly the ordinary rail fence.

The buildings on both farms are well constructed, useful, and well kept. On the farm on which Mr. Black lives the main barn was enlarged some years ago by taking off the roof and siding, and adding ten feet in width to each side and another bent to the end.

The buildings on this farm are on the level, and consists of all the necessary buildings required, and may be classed as a very good lot, but in the opinion of your judges who come from cattle raising sections of the country, not at all comparable with the well constructed bank-barn, neither as regards economy or convenience. Meaning by that, that suitable buildings for stock can be put up at less cost, and the labour required in attending to a given quantity of stock is much less than when the buildings are constructed without stabling and feed rooms, etc., beneath.

On the other farm, or what Mr. Black terms the "old homestead," it being the home

of his boyhood, there is a large bank-barn 105 feet by 60 feet. Under this barn, besides sheds, is stabling for forty-five cattle, and also a large root-house. The stables are paved with stone, and altogether it is pretty well fixed up. The buildings are all supplied with fine strong eave troughs. The water supply at the yards is from a well, and from water collected from the roofs.

As already said, the crops were uniformly good at the time of our visit in July. They consisted of 50 acres of wheat; 30 acres of oats; 15 acres of peas; 40 acres of barley; hay, 63 acres, about half of this was clover; and 11 acres of roots. The balance pasture and woodland.

Three teams and a driving horse are required for the work of the farm; besides these there is some fine young stock. Altogether there was at the time of our visit fifteen horses, including three Clear Grits, two Terrors, and a very fine pair of two-year-old Concords. The horses are a splendid lot.

Forty or fifty cattle are usually kept, including a few pretty good pedigree Durhams. About fifteen head are annually stall-fed. Ninety sheep is about the average flock, the oldest of which are fattened every year and sold.

The system of cropping is to break up sod for peas. Sometimes barley is sown in place of peas, wheat after barley and peas, oats after barley, summer-fallow oat stubble for fall wheat, manure and seed down.

From ten to sixteen acres of roots, including turnips, carrots and mangolds are grown.

The general style of Mr. Black's farming is good, making a specialty of no one thing, but carrying out a system of mixed husbandry in an intelligent and profitable manner.

Leaving Mr. Black's we reached Brampton in time to catch the evening train for Toronto, where we stayed over night, leaving for Newcastle next morning, arriving about 10 a.m.

MR. ALBERT TAMBLYN'S FARM.—BRONZE MEDAL.

Our first business on reaching Newcastle was to find out where Mr. Tamblyn lived. This we found was five and a-half miles north of the village. Next in order was to interview the livery stable man. On this being done, we found he had only one horse that was not out, and as we wanted two, and a man to drive us who knew all about the road, the business was soon settled by the proprietor of the hotel lending his horse. Now perhaps it might be as well to explain why we wanted two horses and a man to drive us, or otherwise we might be charged with putting on unnecessary airs. Well, the reason was this, if we did not make good time we could not have got back to Toronto the same night, and that would have thrown us back a whole day, besides making us a day later in reaching all the other farms, and would no doubt have put some to inconvenience in waiting a day longer for us than was expected.

The road to this farm passes through a magnificent farming country. From the time we left the town we did not pass a single bad or ill-kept farm. The indication all along either side would lead us to suppose that the farms were owned by men who well understood the correct principles of farming, and who had means to carry out their ideas. And while the farmers in that section apparently well understand their business, it is also to be borne in mind that the land is of an exceptionally good quality, and other things being equal, the man possessing a farm which will, with equal labour and outlay, produce as much on two acres as his neighbour can on three, has an immense advantage. Perhaps there is no better way of giving an idea of the value of the land, comparatively speaking, than to state the price which can be realized for farms in the township of Clarke. We were informed that a fair average would not be less than $80 an acre for ordinary well improved farms, and when rented, $5 an acre is easily obtained, and $6 is no uncommon figure.

Mr. Tamblyn's farm lies north of Newcastle, on the Newcastle and Lindsay old toll road. It has a fine southern aspect. A deep ravine with wooded banks runs along the west side; this, while beautiful to the eye, adds nothing to the value of the property. From the highest part a very fine view of the country to the south and east can be

obtained. Looking to the south, at the distance of ten miles can be seen Bowmanville; turning to the east, the whole country to Newcastle is in full view.

But to proceed to more relevant topics; this farm comprises 150 acres, the greater part being a good clay loam, the balance of fifteen acres on the north-west side being sandy.

The crops grown this year are spring wheat, twenty-four acres of two varieties, Defiance and White Fyfe, the former having done much the best. The land appears to be specially well adapted for the growth of spring wheat, a failure, we are informed, being very rare. Twenty-four acres of barley having all the appearance of being likely to give a large yield. Oats, eleven acres; twenty-nine acres of Red and Alsike Clover for hay, seven acres of roots; nine acres summer fallow; balance wood land.

The usual course of cropping is to break up sod; sow one-half with barley, the remainder with peas and roots. It will be noticed that Mr. Tamblyn's practice of growing barley and roots on sod is not in accordance with the system which is commonly followed by farmers. However, this may be said, that whether the plan is a good one or not, on this particular farm the barley was a very good crop. In regard to the roots, it being so early in the season, nothing could be said about them; but it is quite safe to venture the statement that to try and grow roots after sod would, generally speaking, be very apt to result in comparative failure. The second year spring wheat is grown. In preparing the land for it, the barley stubble is ploughed deeply first thing after harvest, then manured at the rate of fifteen loads to the acre, and ploughed-in shallow. Before sowing, it is well worked with cultivator and harrows. With the spring wheat the land is seeded down with eight pounds red clover, one pound of Alsike, and four pounds of timothy, per acre. In harvesting, the stubble is cut high to protect the clover in winter. The following season about 100 pounds of plaster is used to the acre, and it is cut for hay. Occasionally a crop of clover seed is taken off, but Mr. Tamblyn does not make this a general practice, considering it too exhaustive. The clover sod is then ploughed in the fall for barley, cultivated and harrowed in the spring; then sow the barley and cultivate in.

The preparation for turnips is, after the sheep have pastured some time on the clover in the spring, to plough up deeply, then harrow and roll, and afterwards cultivate and harrow. About the middle of June, cross plough and work well, then manure and drill up. The roots grown are turnips and carrots.

It will be observed that the land has been only one year in clover, which makes it a very different thing to prepare for a crop than if dealing with a field which had been down in grass two or three years. In the rotation just described, there is no room left for oats. This was explained: about fifty acres on the west side of the farm is inclined to be flat; on this land oats and grass are principally grown, with an occasional catch crop of oats on the first mentioned 100 acres.

The farm is laid out into fifteen-acre fields. The fences are nothing to boast of, rugged and not very well kept. The buildings roomy enough, but lacking in that general nice appearance which is so noticeable in the best descriptions of homesteads.

The private road narrow, and not quite in keeping with a model farm. The surroundings of the barn and outbuildings rather untidy. The dwelling-house is a fine, substantial stone building. Between the house and road is quite a deep dell, with a little stream winding along the bottom. On the side of the steep hill running down from the house, an orchard is planted. On the opposite side and along the sides of the stream, trees and shrubs are growing, the whole forming a very pretty little scene.

About twenty cattle are usually kept, and four or five are fattened in the winter. The average flock of sheep is twenty ewes with their lambs. These are Lincoln and Leicester, and are a very fine lot. The lambs are always sold for breeding purposes, and bring a high figure, the sales since last August amounting to $400. It struck us that if Mr. Tamblyn was as careful in the management of his cattle as he is with his sheep there would be something nicer to look at, and the profit would be considerably greater. We did not, however, see the cattle, with the exception of the calves, and as they certainly were not very much to look at, we supposed the older cattle would be just like them.

The working force consists of two men, two pair of horses and an odd one. Besides

the farm entered for competition, another one of a hundred acres, a mile and a-half distant, is also worked.

After making all due allowances for weak points, Mr. Tamblyn may be classed as a good farmer, a man, apparently, of a good deal of energy, which is displayed in the direction of making large profits from his farm.

In driving back to Newcastle we passed through the thriving little village of Orono, a village chiefly noticeable on account of its well-constructed buildings. There is a uniformity in this village more marked than we ever remember seeing before in any village in Canada. The uniformity consists in neatness of design, the superior way in which the buildings are kept, and the tidy and well ordered premises. There appears to be a fitness about it when we consider that it is just in keeping with the well appointed farms already referred to, and from which the village draws its support.

As there was only one farm entered in the county of Durham, we left the same evening for Toronto. Next morning, accompanied by Mr. H. Wade, the Secretary of the Agricultural and Arts Association, and Mr. William Rennie, Vice-President of the Toronto Industrial Exhibition, we made an early start for the farms in the county of York. Going by the way of Yonge street as far as Thornhill, we turned to the west and travelled two and a half miles to the farm of Mr. David Smellie.

MR. DAVID SMELLIE'S FARM.—SECOND SILVER MEDAL.

This farm comprises 175 acres ; is situated in the township of Vaughan, in the West Riding of the county of York. It is, everything included, the most beautifully fitted-up farm we ever remember seeing. From the rail fences to the last touch of the painter on the front door, everything is absolutely perfect, as far as appearance goes, and in most cases the useful has not been neglected.

The soil is a strong clay loam, with a retentive subsoil ; as the nature of the subsoil would indicate the farm was originally a wet one. A large amount of draining has been done, and with the exception of one field, which at the time of our visit was very soft, being undrained, it may be termed a dry one, and can be worked at any season of the year when the frost is out.

The farm has a frontage of eighty rods on the public road, and running back a mile and a-quarter to the next concession.

A private road in capital shape runs from front to rear in the centre of the farm, leaving the fields the same width on each side. These fields are of a uniform size of twelve acres, and opening, as they all do, into the private road, makes the field arrangement perfect.

The fencing has been well done. The fields are mostly fenced with pine rails, well put up and perfectly straight, not a rail to be seen out of place on the whole farm. A board fence runs along the front of the farm next the road, and on each side of the private road to the house.

There are quite a number of small enclosures around the buildings, including orchards, gardens, etc. These are all surrounded with either board or neatly put up picket fences. The latter all well-painted and well-made, and with well-painted gates wherever required.

The homestead is composed of a lot of the finest-looking farm buildings that are to be seen in the county, and must in the aggregate have cost a large amount of money. The main barn is 85 by 60 feet. Included in this is a cattle stable with six stalls and a horse stable for seven horses. These buildings form one side of the yard—on the other three are open sheds and a loose stable. Convenient to the stable is a first-class root-house. There are also excellent pig pens well arranged for convenience in feeding. The cost of this lot of buildings, exclusive of teaming and some other work done by the proprietor outside of the contract, was $4,300, and while exceedingly showy, well-constructed, and thoroughly well-finished in every respect does not, in our way of looking at it, fill the bill of a first-class homestead. The weak point being a lack of stable accommodation. When taking exception to this, Mr. Smellie says he prefers to let most of his cattle

run in the yards and open sheds. But that is clearly at variance with the opinions of the best authorities on stock management in this country.

It is to be borne in mind that our winters are very severe, and what might hold good in a country where the climate is more genial will not answer here. Besides this set of buildings there is at a short distance a large hay-barn, 45 by 60 feet, which at our second visit was well-filled with hay.

In connection with this is a large sheep-house with a yard surrounded with a high well-built board fence, perfectly dog-proof.

We almost forgot to mention another building which faces on the private road, midway between the front and rear of the farm. Like the others, this is frame and is 60 by 26 feet, two storeys high, the lower part being an open shed and the upper part used for storing hay. A pump and well being here makes it very convenient for feeding the horses at noon, when working in the back fields. As there is always during summer a supply of water kept in the trough at this place, and as the fields all open into the private road, it is in this way accessible for cattle pasturing in any part of the farm, and answers a good purpose as a shelter in hot weather. It is also sometimes found convenient for putting implements in when not in use.

The dwelling-house is a fine brick building on which a large expenditure was made a few years ago. In fact, an old building remodelled—always an expensive matter, and often in the end not very satisfactory. However, in this case Mr. Smellie has the satisfaction of having a beautiful residence, with every convenience required in a farmer's home. The best way to describe the orchard, garden, and grounds generally about the house is simply to say they are perfect in every respect. No one but a person possessed of a high appreciation of the beautiful could ever have made such a pretty place. In carrying out his ideas of what was beautiful and useful, Mr. Smellie has done a great deal of planting on the road side. On each side of the private road, as well as here and there about the grounds and yards, trees have been planted wherever they would be useful or ornamental. Around the orchard Norway spruce have been planted. Those on the roadsides are chiefly the American silver maple. These have all been planted a number of years and evidently have been well attended to.

The woodland, comprising thirty acres, is a fairly good piece of hardwood bush, kept in pretty fair shape.

The acreage of the different crops this year is :—Fall wheat, 24 acres—at the time of our second visit this had been partly threshed, and was a fair sample for this season ; 24 acres of oats, of these one field had been cut, in the other the reaper was at work, both were very heavy, and although very much tangled and lain were neatly taken off, showing the advantage of having the surface of the fields smooth and free from any obstruction ; Mr. Smellie being able to work his machine in lying grain with perfect freedom, knowing that over his whole farm there was nothing left on the surface to hurt a reaper, no matter how low he liked to cut ; 58 acres of hay, this like the other crops was very heavy ; summer fallow, 24 acres ; balance, pasture and yards.

A course of cropping which Mr. Smellie usually follows, is to break up sod for peas, then fall or spring wheat followed by oats ; after oats, barley or summer fallow, then fall wheat. The land sown with fall wheat is always seeded down—timothy being sown in the fall and clover in the spring.

The mode of working the summer fallow is to break up deeply in the fall, then work thoroughly with plough, cultivator and harrow, always giving at least one deep ploughing in the summer—summer fallow is always manured. Fifteen cattle are usually kept, and not much done in winter feeding. There were no sheep at the time we were there, having sold out his entire flock some time ago. He, however, intends to buy again.

Six horses are required for the work of the farm. The farm servants kept are : one man for the year, one for eight months, and two extra hands for a couple of months.

MR. WILLIAM RENNIE'S FARM.—FIRST SILVER MEDAL.

The next farm to be inspected was Mr. Wm. Rennie's, one and a-quarter miles east of Yonge street and fifteen miles from Toronto—it is lot fourteen, second concession of

Markham, in the East Riding of York, and contains 120 acres, of which 107 acres are under cultivation, the balance being woodland. The soil like that on most of the adjoining farms is clay, with a clay subsoil which becomes more retentive towards the west side of the farm. Before it could be worked to any advantage a great deal of draining required to be done—some portions of it being springy, and most of the remainder inclined to hold water unless artificially taken off.

Before commencing, Mr. Rennie studiously planned and mapped out a complete system of drainage—this had been wisely done, and as a result this is a thoroughly well-drained farm. In carrying it out, Mr. Rennie aimed as far as possible to do without open ditches, there being only one on the farm, and into this a large part of the covered drains empty. Too much cannot be said in favour of covered drains, over open ditches, where the latter can at all be avoided—the ditches are a constant source of expense in keeping them open. If on the side of a fence, they are too often perfect hot beds for the production of all sorts of foul seeds, and if in the fields away from the fences they are an annoyance in working the land; besides the land which they occupy is in a great measure useless; and lastly, the land on either side is not nearly so free from water as when covered drains can take their place.

If any evidence had been wanted of the thorough way in which the work had been performed, none better could have been offered than our going over the farm at the time we did; this was immediately after the heavy June rains, when anything like imperfect drainage would have been at once noticeable.

The fences are mostly straight rail very nicely and evenly put up; they are built by sinking strong cedar posts deeply into the ground, nine feet apart; the sides of the posts next to the rails are set perfectly straight; scantlings are then fastened against the posts with wire at top and bottom, wide enough to admit the ends of the rails—the rails being pine are more uniform in size and shape (being nearly square) than those made from any other timber. Fences put up in the way Mr. Rennie's are look well, and for a good useful fence are very hard to beat. The exception to this fence is, a short piece on the eastern boundary, which is the common stake-and-ridered; and the short fences about the gardens, yards, and grounds around the house, these are neat board and picket. The quantity of inside fencing on this farm is small, compared with that on most farms of an equal average—the reason for which will appear when Mr. Rennie's system of farming is described. As might be expected on such a well-appointed farm, there are well made and substantial gates wherever required, and like all the other improvements carried out, this part of the work has been well done; no lifting or pulling when you want to open or shut a gate. This may appear a small matter—but after all the fact remains the same—that many farmers' gates don't work as nicely as they ought to do.

The private roads are well made: nicely graded and turnpiked; neat and smooth. One of these roads runs from the public highway to the buildings (these buildings are situated exactly midway from front to rear of the farm), another from the buildings to the north side, gives access to that side of the farm and also to the bush land, in which is running water during the whole season. Besides the two already mentioned, there is a third roadway running to the rear of the farm, thus making the arrangement for reaching all parts of the farm from the homestead complete in every respect.

The buildings consist of main barn which is chiefly used for storing grain, this is 56 by 36 feet; in addition to which is a cow stable at one end, and a sheep house at the other. At right angles to this is hay and feed barn 74 by 34 feet; included in this is a horse stable fitted up for six horses. On the opposite side of the yard is another building of the same length; this is used for cattle stables and pig house—these are all well fitted up. In this way the yard is surrounded on three sides, the south side being open. Under the main barn is a cellar 36 by 20 feet, used for storing roots. Besides the buildings already mentioned there is a driving shed 30 by 40 feet, with cellar the full size of the building, and an implement shed 36 by 24 feet. These buildings are all frame, well-painted, and the roofs covered with a composition of coal tar. It may be mentioned that all the painting, and a great deal of the general improving is done in spare time, without getting outside assistance. There is still another little building which must not be forgotten, that is a small one in which is a blacksmith's forge. This, Mr. Rennie claims, is

a great convenience, often saving the time required in sending a considerable distance to a shop to have some trifling thing mended or made, which can be done as well at home, and in utilizing the time on wet days when it is sometimes difficult to find useful employment for the hands Now, this may hold good to a certain extent, in occasionally doing some simple job; but it is questionable if, as a rule, much is made by a farmer doing much of that sort of work.

The dwelling-house is a nice, snug-looking, well-painted frame building, and is a useful-looking farmhouse.

We should have said, when speaking of the stables, that they are fitted up for twenty-eight cattle and seventy-five sheep.

The general surroundings are in keeping with the homestead—order and good taste displayed at every point. In the course of a few years the appearance of this place will be very much improved, through extensive planting, which has been done during the past season. A thousand Norway spruce having been imported and planted about the grounds—the principal part of which are planted around the experimental plot of two acres and the orchard. These, in the course of a few years, will form a close and beautiful wind-brake, and will be very attractive in appearance. Along the road side is also a fine row of Silver maples of five or six years' growth.

The acerage of the different crops is: barley, 15 acres; oats, 12 acres; 4 acres of white clover, this is raised for seed; 15 acres chiefly in hoed crops, 2 acres of this is in potatoes of numerous varieties, grown for seed; half an acre of onions, and 2 acres of beans; an acre of Sugar beet; the balance, mangolds of different varieties, of which the Long Red appears to be the heaviest crop. A few drills of turnips had been sown, but were a total failure. Mr. Rennie informs us that the land around there is not all suitable for turnips, and but few are grown. The roots are a remarkably fine crop and will produce a very large quantity of feed. This crop, judging from the appearance, both at our first and second visit, gave evidence of having been well managed from first to last. We may here state, Mr. Rennie's system of preparing land for roots:—As soon as he can get time, after harvest, the land is heavily manured and ploughed under with a shallow furrow; afterwards deeply cross-ploughed, with a subsoil plough following—in this way stirring and breaking up the soil to a considerable depth. The land is harrowed and well worked up, and towards the latter end of the season it is drilled up with a double-mould plough, and left in that shape until the spring, when all that is required to prepare the land for sowing is, to harrow down the drills and remake and sow on the freshly drilled soil. Previous to drilling up the last time, 200 lbs. each of salt, plaster, and bone dust is sown to the acre. Fifty-three acres was cut for hay this year. The noticeable feature about this was not only the large quantity to the acre, but the closeness of the grasses. This, like the root crop, being something experimental, it may be well to state the plan followed in seeding down, at least in seeding down for this particular field, which we are speaking of—for it may be mentioned that Mr. Rennie does considerable in the way of testing the value of different grasses—and as he appears to have succeeded in what we saw, we will give what was sown; altogether, twenty-seven and a-half pounds per acre was the quantity used, divided as follows:—Red clover, 6 lbs.; Alsike, 3 lbs.; timothy, 4 lbs.; white clover, 1 lb.; sweet vernal, 1 lb.; yellow oat grass, half lb.; and 2 lbs. each of the following grasses: Orchard grass, perennial rye grass, Italian rye grass, red-top, blue grass and meadow fescue. Now this seems a great deal of seed to sow, and a great many varieties, and we don't give any advice on the matter, but just simply state that it was one of the finest bottoms of grass we ever saw, and from the unusual closeness was very much finer in quality than an ordinary rank crop of clover. At our second visit another heavy crop could have been taken off, but Mr. Rennie wisely, we think, preferred to feed it on the land—and at that time there was in pasture fifty sheep and lambs, three cows, and six steers just brought in. Since then twenty more steers have been bought. All the steers and sheep being intended for winter fattening, as well as more sheep yet to be purchased. Woodland and pasture comprise eighteen acres.

The fattening cattle and sheep are kept on until the spring and are heavily fed. The

theory carried out on this farm being to lay on flesh as rapidly as possible. All fodder is cut, this is fed with meal, bran and oil cake ; roots are cut or pulped.

The rotation followed varies with the nature of the soil on the different parts of the farm. One portion of this farm lying well up and a large part being flat. The course is usually in grass two years, then grain, the variety depending on the nature of the soil ; this followed by roots, chiefly mangolds, for the reason already stated, that turnips are not suitable for this soil ; the next year grain seeded down, usually spring wheat or barley.

Two teams are required, these are grand animals, one pair having been sold after we were there in July, for $650, and another pair bought in their place. They are kept in the stable summer and winter, Mr. Rennie thinking that they stand the work much better than when allowed to run on the grass. The working force is two men all the year, and extra help when required.

In connection with this farm is an experimental plot of two acres. This is used almost exclusively for testing the various grasses and seeds. Here is to be seen numerous rows of potatoes carefully labelled ; over twenty different varieties of fall wheat ; mangolds of all varieties, and seeds of innumerable sorts are here tested before being offered for use in other men's gardens or farms. This plot is entirely under the management of one man, and is in no way connected with the farm. In dealing with the farm management we took this in no way into account ; we just simply mention it as being connected with the farm.

The men are all boarded in the house by the foreman, at so much per week as agreed upon.

The farm account is kept in the office in Toronto, where Mr. Rennie carries on a large business as a seedsman. It is simply a ledger account ; everything paid is charged, and all receipts are credited ; this account is balanced annually. Although buildings fences, etc., were considerably out of repair when Mr. Rennie took the farm three years ago (it having been rented for eleven years), and a large amount required to be expended to put them in proper shape, it has, taking the present cost value of stock, etc., paid him seven per cent. for the capital invested for the three years.

Now, we are quite well aware, that our awards will be sharply criticized, and not unlikely, more so on account of our awarding one of the highest prizes to a city man. But we would just say this, that it is a pretty difficult matter to find a weak point in the system carried out on this farm. It is a very high style of farming, carried out in a thoroughly practical manner. It may be said by some that there is too much paid out for labour for the size of the farm, but it is to be borne in mind, that when Mr. Rennie took hold of this farm three years ago, a great deal required to be done, and a very great deal has been done. Another thing to be considered is this, that a man whose time is largely taken up in a city business, fifteen miles from his farm, and yet possesses that executive ability, as well as that thorough knowledge of the practice and theory of agriculture, so necessary to make farming remunerative, is an exception rarely met with, and we have no hesitation in saying, that men like Mr. Rennie do much to advance the interests of agriculture ; they do much towards raising the status of farmers by ennobling the calling; and they set an example, which, if carried out by farmers generally, would add enormously to the material wealth of the land.

MR. WILLIAM MILLIKEN'S FARM.

After finishing our inspection of Mr. Rennie's farm, we drove east about seven miles to Hagerman's Corners, where is situated the farm of Mr. Wm. Milliken. Although the evening was pretty well advanced before we got there, we concluded to go at once to work, and for the next two hours we made good use of our time going over the farm ; leaving the buildings, stock and fields adjacent to the buildings, to be gone over in the morning. This advanced our work considerably, as well as being more pleasant than tramping through wet fields for two or three hours in the morning. In fact, it is not by any means the most enjoyable part of farm-judging, to be asked in the early part of the morning, when every green thing is hanging with moisture, to walk across a clover field,

and a ploughed field just beyond, to see something that did not at all bear upon the work in hand. When this sort of thing did occur, one of your judges always managed to slip out of it, in some easy way, never failing to find some plausible excuse, leaving his more obliging associate to go through the ordeal with a pleasant countenance, making the proprietor believe that he just enjoyed that sort of thing.

Well, to go on with the description of the farm, it is situated on the 6th Concession of Markham, and comprises 175 acres; the soil being a strong clay loam. The Midland railroad runs through the back part, cutting off about thirty-five acres; twenty-two of which is woodland, with a fine growth of young timber, the cattle having been kept out of it for a number of years. The public road bounds the farm on the north and east sides. Along the road side on the north, are planted a row of maples, and inside of that row, at a distance of five feet, is a row of healthy young spruces. Also, along the north side of the garden and lawns, is a fine row of pines, about twenty feet high, these look very nice and answers a good purpose in breaking the cold north winds. A well-kept cedar hedge divides the kitchen garden from the lawn. On the road side in front of the orchard on the east side, spruces are planted with a view to beauty and effect.

The fences are partly board, straight rail, and a number of the inside fences are the common rail, and not in very good shape; taken altogether it is hardly what would be classed as a well-fenced farm. A private road runs from the homestead to the back part of the farm, as far as the railway. This road, while it answers the purpose quite well, does not show to such good advantage as others we had seen, being marred a little by some stone heaps at different places. As above said, this road only runs to the railway; the railway company have refused either to make a crossing or build a bridge at this point. The land at the other side of the track is in this way inconvenient to reach, requiring either to go round by the public road at one end, or across the farm to a level crossing at the other; for this reason this part of the farm is mostly left in pasture. There is also a lack of convenience for reaching some of the fields on the south side. At the time the private road was made it was put in the centre of the farm, but since then and about eight years ago, Mr. Milliken purchased the adjoining farm, so that now the road is forty rods from one side, and a hundred and ten from the other, thus making the field arrangement somewhat awkward.

There was grown this season, ten acres of fall wheat, and eighteen acres of spring; this was a heavy crop. At our second visit one field was still uncut, and was badly battered and broken down, partly owing to being allowed to stand too long before being harvested; seventeen acres of six-rowed barley, and five acres of Russian, the latter is said to be yielding very heavily in that section. Oats, twenty acres of black Tartarian, and five acres of Provister; peas, six acres. The spring grain, with the exception of peas on this farm, like all others we had visited, was good in quality, and will yield well. For hay, thirty acres. Seven acres of roots, consisting of mangolds, turnips, sugar beets, carrots and potatoes. The root crop has been specially well put in and has been well attended to since. The balance, summer fallow and pasture.

As far as possible Mr. Milliken tries to carry out a regular rotation. When sod is broken up, peas or oats, or both, are usually sown, followed by barley, then root crops, with a pretty heavy coating of manure put on the land the fall previous. After roots comes spring wheat. Considerable salt is used on the spring crops, and with marked benefit. Mr. Milliken claims to have often tested it, and invariably found the straw brighter and stiffer, and also he finds that it very materially benefits the root crops.

The number of cattle usually kept is about twenty, of which sixteen are pretty fair Durhams, with a capital bull at the head of the herd. Formerly a few cattle were stall-fed; but last season none were fed, owing to the difficulty of procuring the right class for feeding. Twenty breeding ewes is about the average flock; these are pretty fair Cotswolds. A good many pigs are ordinarily kept—at this time sixteen are in the pens.

The buildings are a fairly good set, and equal to the requirements of the farm where not much stall-feeding is done. There are stalls for twenty cattle, besides calf stable, and stabling for ten horses. The mares are a specially fine lot, and with the young

stock are worth a lot of money. Some of these, no doubt, will be heard from at the coming shows.

The dwelling-house is a well-built, nice loooking farmhouse, with good surroundings, including a clean, well kept garden, and a good orchard.

This may be classed as a fairly well managed farm, carrying a better class of stock than appeared to be common on the farms we had passed; and the only one that was entered for the county of York on which anything like breeding good cattle was attended to.

The absence of a better class of cattle on the farms which we passed, when driving through the townships, rather surprised us. It is certainly not because good cattle are not bred in this part of the country, for on the contrary some of the most noted breeders in Ontario live not a great way from here. Among others are Messrs. Russel, near Richmond Hill, whose splendid herds and flocks we had the pleasure of seeing the day before; and if we had not remembered their success as breeders we would have been left in no doubt after entering the house, and seeing the numerous diplomas received in many a close competition with the best herds and flocks in Ontario.

We would attribute the little attention apparently bestowed on cattle-raising and feeding by many of the farmers adjacent to Toronto, to the excellent market there is in that city for nearly everything grown on the farm. And it would appear to us that if this exhausting system is carried on much longer that the bad effects will assuredly be felt. Even the rich lands of Vaughan, Scarborough and Markham will give out under a constant system of cropping, when but comparatively little is returned to the land.

Before leaving Mr. Milliken's farm we would notice a splendid view to be obtained from the high part of one of the fields. From this point, looking north-east, can be seen the villages of Markham, Stouffiville and Bloomington, and a portion of the township of Uxbridge. The eastern view takes in the township of Pickering, and as far away as the hills in the township of Reart—thirty miles distant. To the south is Scarborough, with its heights ten miles away. On the west is Vaughan and the little village of Thornhill; and the north takes in Unionville and part of the township of Whitchurch. This view probably takes in the finest section of farming land that is seen from any point in Ontario. The sight is a magnificent one. To give an idea of the extended view, we may mention that fifteen churches are to be seen from where we were standing. We felt when looking over this grand farming country, with its thriving villages, that it was a fitting background to the great metropolis of Western Canada.

MR. SIMPSON RENNIE'S FARM.—GOLD MEDAL.

Leaving Mr. Milliken's early in the forenoon, we soon reached the farm of Mr. Simpson Rennie, lots twenty-nine and thirty in the Gore of Scarborough, lying on the north-west end of the Canada road, three and a-half miles south of Unionville, and fifteen miles north of Toronto. It contains 102½ acres, of which six acres is woodland. It is bounded on two sides by the public road, and is also divided by another road running east and west, cutting off twenty-four acres on the south side, including the six acres of bush. The soil is a strong clay loam, with a clay subsoil; and before Mr. Rennie carried out a complete system of drainage was what would be termed a wet farm. An accurate map of the drains has been made, showing the exact position of each, thus enabling Mr. Rennie at any time to locate the exact direction of any drain in case of a stoppage. On the farm we are now describing there have been 3,200 rods of drains laid. Tile has been used in all cases, and the work has been so thoroughly well done, that although, as the reader will remember, our inspection was made at a time, when, if there had been anything faulty, it would have been readily seen; but after the most careful examination not a wet spot was found on the farm. There are three open ditches, which in the aggregate amount to 128 rods. These are unavoidable owing to the large body of water which passes down them in the wet season. We were forcibly reminded when on this and some other well drained farms in the same section, of the close relation there is between drainage and successful agriculture. There is many a farmer in Canada, after hard years of toil, who has now money lent out, and is drawing his dividends, who

would be thousands of dollars richer if the money had been spent years ago in draining his own farm. We are led to speak in this way, for we know of many farms owned by well-to-do men who are drawing six or seven per cent. for their money, when twenty could be obtained by spending it on their own land.

Perhaps after all, the loss sustained by excessive rains of this season may result in good ; it will, if it only teaches farmers that the one great improvement of all now required in Canadian farming, is a system of thorough tile drainage. If every farmer in Canada had seen the Messrs. Rennie's farms as we saw them, many a thousand dollars would be drawn from the bank deposits during the next twelve months, and invested in drain tools, tiles and draining.

Not much requires to be said about the fences, further than that it is chiefly fenced with straight rail fences, exceptionally well put up. The description of similar fences on the first farm visited in the East Riding, applying to these. All the fences around the grounds adjacent to the homestead, are board or picket ; wherever required there are first-rate gates, these are well hung on substantial posts, nicely rounded at top, and well painted to preserve them from the weather. It may be as well here to speak of the planting, as part of it has been done with a view of having a close and beautiful hedge around the orchard. This has been planted partly for ornament as well as to serve for a wind break. The orchard comprises two and a-half acres of healthy young trees. On three sides is a row of Norway spruce planted three feet apart, these are now about ten or twelve feet high, and having been carefully attended too, not the slightest break is to be seen anywhere. They are trimmed on the top and sides perfectly straight, and are as even as a board. For ornament and effect we never saw this equalled. On the south side and next the house there is a nice little grove of pines. Besides this, considerable planting has been done in other ways. Near the house we saw a nice little lot of horse chestnuts. These had been grown on the farm for transplanting when required. In connection with the planting we may also speak of the woodland. This comprises six acres, lying on the high part of the east side of the farm, and shows to good advantage. It has been well managed, nothing but dead or decaying timber being cut. This causes it to have a healthy, fresh look, and from the position it occupies on the farm, adds to the general appearance.

Owing to the highway dividing the farm, not very much is required in the way of a private road, but what there is, is in excellent shape.

The homestead like those on the last two farms, forms three sides of a square, and consists of a main barn 74 by 40 feet ; included in this is a stable for feeding cattle, with stalls for eleven at one end, and at the other end is a cow stable, with barn mows above each ; underneath the barn and between the two stables is a root-house 30 by 40 feet, with short stairs up to each stable. We think that there is something wrong in any place that requires roots to be carried upstairs, that is, where any considerable quantity is fed. In constructing a homestead this should always be avoided if it can be done without too much cost. This carrying upstairs is laborious work. Another barn stands on the north side and at right angles to the first-mentioned ; this is 60 by 32 feet, with a sheep house at one end, 32 by 20 feet, and on the west side of the yard is a building 74 by 26 feet, this is used for various purposes. Included in this is the pig pens, and one of those useful places which should be at every homestead, generally called a loose stable. Besides these building is a horse stable, waggon shop and carpenter's shop ; this is divided from the main barn by a driving shed, and between these buildings and the dwelling-house is a carriage house, implement and woodshed. This is a neat, roomy, and well-painted building, 30 by 46 feet, and shows to advantage between the dwelling-house and barns.

The dwelling-house and surroundings need not be particularly described, further than to say, that the house is in every way suitable to the requirements of the farm. There is a snugness and an air of comfort about it, with its neat trim garden and sheltering trees, which would be likely to cause the passing traveller to say " what a cosy place."

The different crops this year comprise 12 acres of fall wheat, 22 acres of barley, 17 acres of oats, 21 acres of hay ; 8 acres of roots and hoed crops, chiefly mangolds, the balance being carrots, potatoes ; $1\frac{3}{4}$ acres of corn ; and 3 acres of summer fallow. These

crops without an exception were all good, showing an evenness, which indicated not only well-drained land, but first-class tillage.

The root crop had been especially well put in, and at our second visit, we found, had made good progress. The potatoes, however, were affected with the rot, and the corn had got badly hurt with the frost. As well as mangolds, Mr. Rennie grows sugar beets, and as we had often heard them compared with mangold, we asked Mr. Rennie's opinion, knowing that more reliance could be placed on his experience, than of a dozen men who dealt in theory. After carefully testing them, he gives the preference to mangolds, and sums up in this way: The mangolds are slightly the heaviest croppers, while the sugar beet, although not quite so heavy, are more nutritious, this making them stand about even when they are housed, but the latter gives considerbly more work to harvest, being harder to pull and a good deal worse to top.

The few rows of turnips which looked rather poor at our first visit, had not gained much at our second.

On the last occasion when we were there, harvest was finished with the exception of drawing in two loads of oats. Considerable ploughing had been done, and manure was being drawn out.

Mr. Rennie has, like other farmers. sometimes to vary his rotation—until the pea bug began to be too troublesome, peas used to be sown on sod—for the first time clover-sod was ploughed up last fall just about harvest, and sown with fall wheat; this had come through the winter well, and had all the appearance of being a good heavy crop. This will be followed with barley, then oats; and the oat stubble heavily manured in the fall for next year's root crops—afterwards comes barley seeded down.

The system of tillage with all first-class farmers is so similar, that we hardly need to go to any length in describing it; it means plough deep, and to work thoroughly.

Manure is ploughed in in the fall with a shallow furrow, and again deeply before winter sets in. In working the roots we saw what appeared to us a good idea; after the horse hoe had been pretty freely used, a single narrow share was fitted on to the frame, and the land was deeply broken up between the drills. This benefits the land, and must have a good effect on the growing crop.

Mr. Rennie does very little in raising cattle, but buys after harvest and fattens annually eleven heavy steers, and generally has half-a-dozen lighter ones running in the straw yard. The first lot had just been brought home when we were there; most of the fodder grown is consumed on the farm, and most of the grain grown is sold, and that of a cheaper quality bought for feeding. It may be remarked, that the barley grown in this and some of the adjoining townships, is much above the average quality. A number of pigs are also fattened.

A statement of the produce grown on the farm, and also what was done in the way of feeding in 1882, will give a good idea of what the farm produces, and the way in which it is used, as well as the profits of the system.

The following is the statement received from Mr. Rennie:—

——	Number of Acres.	Yield in Bushels.	Received per Bushel when Sold.	Amount Received.
			$ c.	$ c.
Wheat	10	350	1 10	385 00
Barley	18½	993	75	774 75
Oats	15½	920	50	460 00
Peas	6	125	72	90 00
Corn	1¾	in cob 250	35	87 50
Mangolds	2¼	2000	10	200 00
Carrots	¼	250	10	25 00
Potatoes	1	160	50	76 00
Hay	22	tons 35	per ton 14 00	490 00
				2,587 75

Result of Feeding Eleven Cattle.

Cost of cattle		$460 00
Ground pea and barley meal		145 00
Uncut hay		125 00
Roots		125 00
Total		$855 00
Received for cattle when sold	$920 00	
Cost of six young cattle, which ran in straw yard		160 00
When sold, brought	190 00	
Cost of seventeen pigs $85 00, meal and other feeds $93 00		178 00
When sold, brought	208 00	
Showing a difference between buying and selling price of		$613 00

MR. GEORGE MORGAN'S FARM.

The last farm in the county of York to be gone over was that of Mr. George Morgan, lot 32 in the 3rd concession of Scarborough. The farm comprises 123 acres, all cleared except three acres in the south-east corner. The soil is a rather heavy clay with a tenacious subsoil. On this farm like the last we were on, a great deal of draining had been done, not less than 3,000 rods of tile draining having been laid down. Mr. Morgan informed us that when he commenced to drain his farm twenty-three years ago, it was almost worthless. Many farmers might take a lesson from the results which have followed, it is enough to say that it is one of the finest farms that is in the township in which he lives, and that is a good deal to say when speaking of the township of Scarborough. There is no question whatever that there is hardly any outlay which is made upon the farm, with a view to permanent improvement, that brings such a quick return for the money expended, or gives so much satisfaction for the work done, as there is in the money expended, and the labour performed in draining the wet lands on the farm. We were informed by intelligent farmers, who had done considerable draining, that it was no uncommon thing to be fully recouped for the whole outlay in the increase on two years' crops.

The fences are straight rail over all the farm, those around the dwelling-house and homestead board and picket—well made gates everywhere.

The barn buildings are extensive, well-constructed—standing on stone foundations well off the ground—eave troughs wherever required, and although not so showy as Mr. Smellie's, are, taking all things into consideration, the best set of barn buildings we had seen on any of the farms entered for competition in the county of York. The dwelling-house is a large, roomy, well-constructed farmhouse, built of brick, with large back kitchen and woodshed, frame, nicely painted. The surroundings tastefully arranged and everything in good shape.

The yards on this farm had all the manure drawn out and everywhere tidiness and order were noticeable—we may here remark that nothing has been said about the management of the manure on the other farms for the reason that in all cases it appeared to be managed in the same way, at least up to the time we were there—that is, all that had been made during the winter was still in the yards, and in most cases it was no easy matter getting about them—the unusual rainfall having made them as soft as a sponge. It seemed to us that however much we may differ about the theory of turning manure—we might all agree as to the advantage of keeping the yards in a little better shape in the summer, if it was only to the extent of throwing up a few feet wide around the outside into the centre so as to make it more convenient in getting about.

In regard to rotation or tillage there is nothing calling for special mention, it is

farmed very much in the same way as the other well-managed farms in the same section. The number of cattle is about twelve—this seems to us very few for a farm of that extent. The private road divides the farm into two rows of fields and is as convenient as it can be made.

Everything about this farm bears evidence that Mr. Morgan is an intelligent and successful farmer—and that system and order prevail in carrying out every detail of the farm, and we would just say that it is no disgrace to be beaten where the farming is all so excellent.

Having got through with this farm we started for Toronto reaching there just in time to catch the train for Collingwood, reaching that stirring little town about 11 p.m., pretty well tired. Next morning we took the train for Stayner, reaching there about 8 a.m. Next thing in the programme was to arrange for some way of getting out to the farm we had come to inspect—and in a short time we started with such a mean looking horse and rig that it was a matter of satisfaction for us to think that we were not likely to meet anyone who knew us. However, before our five miles was got over, one of your judges, who is somewhat of a horseman, came to the conclusion that the animal was a splendid stayer—and from that fact when we got back to town our friend, the livery-stable man, imposed an extra charge. We might have viewed the matter from a wrong standpoint, for we thought it was rather sharp practice to give us a horse that could not go, and then charge us extra because we did not get back in time ; but for peace sake we paid it.

MR. WILLIAM ROBINSON'S FARM.—BRONZE MEDAL.

This is known as Maple Grove, and is situated two and a-half miles from Stayner, in the township of Sunnidale, in the West Riding of Simcoe. It comprises 284 acres, of which 140 are cleared the balance being woodland. This farm is exceptionally well watered with a stream both at the front and back.

The general character of the soil is clay loam with a somewhat free subsoil of such a nature that it takes but a short time after heavy rainfalls for the land to be free from water. But even while that is the case, Mr. Robinson, like farmers in all parts of the country, has found a difficulty this season in getting his root crop and summer fallow in proper shape.

In many respects this is an exceptionally well fixed up farm. The plan of arranging the private roads is as convenient as it can be made. The roads are also in good shape. Along part of the front of the farm and all the short fences about the buildings are post and board ; the general fences are of strong cedar rails staked and ridered in the ordinary way, but so well put up that it would be difficult to improve on them, not a rail out of place. The orchard consists of five acres of well kept fruit trees. A row of maples is planted along the front of the farm and on each side of the private road leading from the road to the house.

The crops are fairly good—one field of barley very heavy ; the fall wheat had been badly injured ; the hay crop, with the exception of one field of clover, not quite so heavy as we would have expected on such a soil ; not many roots are grown, only a small piece of mangolds this year.

The homestead consists of a lot of well constructed, well kept, useful buildings, built on the level. The dwelling-house, while not by any means a costly building, is neatly fitted up, and in the internal arrangements neatness and good taste is observable at every point.

In conclusion, we would say regarding Mr. Robinson's farm management that all we saw would lead us to consider that Mr. Robinson is an industrious, prosperous and intelligent farmer. That a great deal of the work done on the farm—more especially in regard to permanent improvements—is well done. But as regards the working of the land and the management of stock we do not consider that there is anything out of the ordinary line of good farming which would call for special notice. We would, however, consider that from the superior manner in which many of the permanent improvements are carried out, including the construction of buildings, fences, private roads, etc., that he should be awarded the riding prize and would recommend accordingly.

In conclusion, we would say that in making the awards we have been earnestly desirous that no mistake should be made in placing the different farms. The difficulty of the task we had in hand will be understood when it is known that in the East Riding of York five were entered, and it being necessary that three of these should be selected, competent men were appointed to make the selection, but failed to agree (at least in striking out more than one), and after failing, left us to decide the matter. Besides the closeness of the competition in the county of York, it is to be remembered that every farm entered this year had points of great merit—notably, Mr. Black's, in the county of Peel, which made an exceedingly close fourth. Where the competition was so close it can readily be understood the difficulty of the task we had to perform in offsetting and balancing the strong and weak points in the management of the different competitors.

In regard to the first prize we had little difficulty in settling, that we consider the management of Mr. Simpson Rennie's almost faultless. To begin with: he owns a farm originally a very wet one, which he has underdrained in such a thorough manner that he can work it with comparative ease in the wettest season, and get his crops well put in while many of his neighbours are waiting for the surface water to go off their fields. The system of tillage is so thorough that hardly such a thing as a thistle or weed is to be seen on the whole farm. This exceptional freeness from weeds is equally noticeable in the garden and every out of way spot around the buildings. Owing to the land being so well drained it can be and is worked deeply, giving a much greater depth for the growing crops to draw plant food from; the crops, as we saw them, giving ample evidence of the productiveness of the land under the system of farming carried out. It may be here remarked that Mr. Rennie possesses more than local fame for the quality of grain and roots produced on his farm; and we are quite willing to venture the assertion that he will rank very high as a prize taker in these classes during the present season.

And although Mr. Rennie is not a breeder of either sheep or cattle, he fully understands the connection between heavy manuring and high farming; the statement of last year's feeding showing that this important source of a farmer's wealth is not by any means neglected. This, coupled with the deep and excellent tillage, appears to be sufficient to keep his land in a high state of fertility.

The awarding of the first silver medal gave us some trouble. The great difficulty, however, was in settling the third prize. Here we had to deal with four farms, and each in a way well managed, yet each had decidedly its weak points.

In the case of Mr. Smellie we take decided objection to the small quantity of stock kept, yet in almost every other respect it ranked high. It is true, no doubt, as he says, that his land produces heavy crops; at all events, judging from what we saw this year, that is the case. But we cannot believe but what this style, however well the land may be worked, will have a tendency to lessen the yield. And that it is only a question of time when many of the farmers in these splendid townships will find they have been drawing too heavily on the soil. However, with these objections, and after the most careful consideration, we believe his to be third-best managed farm in Group No. 4, and award to him the third prize:

In closing, we would just say that the district in which our work lay this year, generally speaking, was noticeable for its good farming. And from our own observation we believe that influences are at work which are rapidly raising the standard of agriculture in Canada. That this should go on will be the wish of all those who have our country's prosperity at heart. And that however much we may differ politically, that we will agree in supporting our Legislators in all measures which will have for their object the advancement of the great agricultural interests of the land. To this end we trust that the scheme which is now being developed, which has for its object the giving of farmers' sons an opportunity of acquiring more knowledge in the common schools of matters pertaining to their own particular calling, will result in great good.

Before closing, we would take this opportunity of expressing our acknowledgment of courtesy and kindness to each and all of the families of the competitors. Wherever we went we met with kind-hearted hospitality.

JOHN I. HOBSON, }
WM. DONALDSON, } *Judges.*

Prizes will be awarded in 1884 in Group No. 5, consisting of the following Counties, viz., Victoria, North and South; Peterborough, East and West; Northumberland, East and West; Hastings, North, East and West; Prince Edward; Lennox; Addington; Renfrew, North and South, and Frontenac.

REPORT OF JUDGES ON PRIZE ESSAYS.

To the Council of the Agricultural and Arts Association of Ontario:

Gentlemen,—As Judges appointed to examine the Essays written upon the subjects prescribed by the Agricultural and Arts Association for the present year, 1883, we beg leave to report as follows upon the first subject:—"The increasing tendency of the times for Farmers' Sons to leave the occupation of their fathers for other pursuits: its cause and remedies," we have been handed sixteen Essays. Of these we arrange the two which we consider the best, in the following order of merit:—

1st. Signed by Thomas Shaw, Woodburn, Ont.
2nd. " by H. F. Honsberger, Springfield, Ont.

Others on this subject are highly commended, and are well worthy of publication.

Upon the second subject, "The best and most practical means of improving the quality of the Butter produced in Ontario, both as regards its manufacture in private dairies and in creameries," we have been handed five Essays. Of these we arrange the two which we consider the best, in the following order of merit:—

1st. Signed by David Nicoll, Cataraqui.
2nd. " by J. Smith, jun., Ratho.

That of Mr. J. B. Bessey we commended next, but as there was no third prize it, at least, deserves to be highly commended.

We have the honour to be, Gentlemen,
Your obedient servants,

Wm. Johnston, Toronto.
James Mills, Guelph.

ESSAY.

By Thomas Shaw, Riverside Farm, Woodburn.

To which was awarded the First Prize by the Agricultural and Arts Association.

That there is an "Increasing Tendency of the times for Farmers' Sons to Leave the Occupation of their Fathers for other pursuits" is assumed in the proposition that forms the subject of this essay. We have only, therefore, to demonstrate the "cause" or causes, and the "remedies."

We assign eight distinct causes, all our space will allow, but which by no means exhausts the list. These are:—

1. A false estimate of the requirements of farming.
2. A false impression regarding its unremunerativeness.
3. A false estimate of the dignity of labour.
4. The professions offer a premium on talent.

5. Farmers can give a profession to their sons at a less cost than they can purchase for them a farm.

6. Many are dazzled by the false glitter of appearances.

7. Undue fettering on the part of parents.

8. Lack of home attractions.

1. A first reason we assign then for the tendency to leave the farm, is a *false estimate of its requirements*, in regard not only to the intellectual and educational capacities required to carry it on successfully, but also in regard to business tact.

One of the most common delusions of country homes is the erroneous idea that any man, no matter what his intellect, or rather no matter what the lack of this, will do for a farmer, a delusion most calamitous to the country at large. While it is true that almost any man may scratch the soil and live at farming (semi-barbarous nations do this), the number now fitted to farm in the proper sense of the term is comparatively limited.

View its *intellectual* requirements.—Agriculture is not only the oldest and noblest of the sciences, but it is by far the profoundest, and most endlessly progressive. We assume this position, and only regret that limited space will not allow us to establish it beyond the possibility of overthrow. Is it too much to assert that long ages after the geologist has most fully established the settled order of the rocks, the precise pre-historic age or otherwise to which each belongs, and even the exact nature of the elements originally that compose them, and that even long after the man of science may have settled what seems insolvable—the precise nature of the element or elements that compose the electric fluid—no two men will even then be fully agreed as to the best method in all its details of raising wheat, even under the same conditions. The field, then, that lies here invitingly open for progressive research and experiment is literally boundless; and though England has her Sir J. B. Lawes, America her progressive rural scientists, and Ontario and the Provinces their Schools of Agriculture, this field as yet has scarcely had her virgin soils disturbed, though men have toiled on her borders from the days of Adam onward. Notwithstanding, young men of the highest intellect will turn their backs on this splendid arena, where research can be inspiritingly carried on amid the light and glory of the sunshine of heaven, and immure themselves within dingy walls, enjoying but the cheerless shades of an opening skylight, to spend life walking shadows, in measuring tape or weighing out teas, amid the turbulent billows that incessantly unsettle commercial life, with their harassing wail.

We believe, however, that the parents are here more to blame than their sons, often encouraging the exodus rather than otherwise, under the erroneous idea that business life is usually more grandly prosperous.

View its *educational* requirements.—"This lad was always fond of study," says the farmer, "I must make a lawyer of him, but this other boy never cared for school, he will do for a farmer." Strange logic. Law may and does require that men be intellectually gifted to be successful, but scientific farming more so. To be able to grasp readily all the important points of an intricate case, and weigh them carefully in the balances of deliberate judgment, may require keen perception, a wide grasp of view, and the matured advantages of most careful training, but surely not more so than the husbandman, who analyses the elements that feed his crops, and the soils in which these grow, determining the favourable conditions most condusive to success in each department, and meeting promptly and to advantage every emergency of wind and weather. The proportion of farmers thus equipped for business is not perhaps one to one thousand.

The idea was popular some years ago, less so happily now, that educated farmers were less successful in their calling than others. It originated, perhaps, in the fact that educated farmers have been comparatively rare, and usually of that incapable class who had tried their hands at other things and failed. If careful education is absolutely necessary to the highest success in every professional line, why not more so in that science that towers head and shoulders above them all? We hold that no man is fully equipped for any business, who has not mastered all its important principles theoretically, and who has not made himself fully acquainted with the practical working of all its details, even the most minute of them. No farmer is thus equipped who is not well educated. Without this he narrows his field of usefulness, and hedges in his sphere of

success, just in proportion to his lack of education in the true sense of the term. By education here, we mean thorough enlightenment in everything that relates to his own business, and acquainted with the principles that govern business in the general. We argue then, that farmers cannot educate too many of their sons, and when educated, they should see to it that a very large proportion of them, including the most gifted, return again to the farm. Nor do we see any propriety in farmers giving their sons a finish at a Commercial College, or some place of higher education, who have never taken a course at an Agricultural College, with a view of perfecting themselves in their profession.

Look at the *business tact* it requires. Why should the farmer require less of business tact than other men? While we admit that business tact may be more absolutely essential to prevent early failure in some lines than in farming, we feel assured that only a circumscribed success can be secured where this is deficient, or even limited. The lines are widening. The avenues for extensive farming are on the increase. Henceforth agriculture will be run more and more in lines, judging by present tendencies, and these constantly extending. One man will manage a creamery, another a cheese factory, a third will fatten largely for the export trade, and a fourth will import and breed pure-bred stock, a fifth will become a wholesale producer of bees, and a sixth will have a seed farm, etc., presenting fields of the widest scope for the exercise of the highest business talent—talent that has been hitherto much absorbed in the business world.

Our remedy for the above is, correct these false impressions by means of the printing press, the general newspaper, agricultural papers, and the platform. Secure the return of even a limited number of educated young men to the farm and the example will soon become contageous. The power of fashion is omnipotent.

2. One of the most powerful persuasives in drawing the young men from the farm arises from false impressions regarding its comparative unremunerativeness.

Without first patiently ascertaining facts, and then even more carefully weighing them, deceived by the false glitter of appearances, one delusive result of that vain show of equipage, that exacting custom extorts from the successful mercantile or professional man, the farmer youth leaps to the conclusion that princely fortunes are the lot of business or professional men only. He reads of Vanderbilt and Rothschild, of the Redpaths and the Allans, and vaguely dreams of fabled wealth almost within his grasp. He never looks behind that screen of mental sorrow, where, with aching hearts and troubled brain, that busy army of 61,133 men of business in our Dominion are bravely struggling for supremacy, *one-half* of whom, alas, are almost certain to go down before they reach the shore, while, of those who do reach land, but a straggling remnant will ever attain to the achme of their wishes, that is, affluence. Most of their comrades will only give themselves and their households the bread of honesty, and will lie down, most likely, without the ripenings of old age, to have their children commence the race much as they began it themselves.

We state it on the authority, and through the kindness of Mr. Williams, the obliging representative of Messrs. Dun, Wiman & Co., of the Mercantile Agency in Hamilton, whose sixteen years' experience in this line entitle his statements on those topics to respectful consideration, that about *fifty* per cent., or one out of every two of the whole number who start in business, fail at some period of their business career, while the proportion of farmers who fail to pay one hundred cents in the dollar is not more than *five* per cent., or one out of every twenty. From this calculation it is clear that the chances of failure in business are as *ten* to *one* when pitted against farming. That the above estimate is near the mark will be apparent when we state (we quote from the published reports of Messrs. Dun, Wiman & Co.) that the proportion of failures in 1881, one of the most favourable years for business, was one in every ninety-three. In 1875, one of the most disastrous seasons commercially, it was one in every twenty-nine. From this we get the average of failures as one to every sixty-one annually. Assuming the average business career to be thirty years, then, at the end of thirty years one-half the whole number of men in business will have become bankrupt. Of course, if the above average of the duration of each business career is too long, the average of failures will be proportionately lessened; but, in any case, the proportion of insolvents in business life is very great. A prominent Canadian journalist, long conversant with this feature of business life, gives it

as his opinion that the proportion of unfortunates in business is more than *one-half*. Mr. Williams is quite decided in his conviction that of those who leave the farm for mercantile pursuits, without having had a previous business training, *nine* out of every ten of them are precipitated into financial ruin.

Surely, if young men on the farm were convinced, that perhaps one out of every two of them who left the farm must go to the wall, they would pause before making so hazardous a venture.

The same authority assures us that the proportion of men in business in the Dominion is far too large. Let our young men weigh this. Herein lies the reason that business is a constant elbowing for supremacy. The gardener's lesson of thinning is the part of wisdom here, a process that disaster will accomplish if human foresight will not. The Dominion has abundant room both for a more extended, and for a far higher system of agriculture, for long years to come.

While we admit that men do not usually accumulate fortunes rapidly at farming (nor is it well to rise thus), we do not admit that farming is unremunerative. In proportion to the numbers engaged in it, observation surely tells us that it is the most remunerative of all the callings. While the average farmer cannot usually make useless dandies of his sons, nor painted butterflies of his daughters, he generally can bestow upon them more valuable legacies. A fair education, untainted morals, a vigorous constitution, something substantial by way of material aid to encourage them in the battle of life at the outset, are legacies within his reach, and why should any young man of spirit require more?

But why should not farming be made more remunerative than it is? Wherein is the limit to the productiveness of any farm but in the wisdom and energies of him who tills it? We make bold to state that there is no farm in Ontario (and there are some admirably managed) that could not be made at least one-half more productive than at present. We feel assured that the owners of the best of these will feel most free to admit the truth of our statement. It is just the extra few bushels per acre, and the extra cents per pound for meat, in which the handsome profit consists; results which a higher system of farming will produce, and which will just make the business remunerative in proportion as it is practised.

That man is rash who, as yet, would presume to fix the limit of productiveness in any soil, in this age of experiment and of garnering the elements of productiveness from the earth and from the air. So long, however, as the present ruinous system of continuous cropping (practised to an alarming extent, and driving the proceeds direct to market) continues, just so long will the idea of comparative unremunerativeness exist. The men who, by giving their lands fair play, by stocking them heavily with animals either for the shambles or for dairy purposes, and who feed them liberally through the product of these, or with judiciously selected fertilizers, are the men who will come to the front. Those who have practised this system have come to the front already, as the stock-feeding and dairying sections of the Province abundantly prove.

Our remedy here, then, is by every legitimate means to give to the youth of the farm the plain unvarnished truth in regard to the vastly superior remunerativeness of farming, in the aggregate, over other business pursuits, and to encourage in every possible way a higher system of agriculture; that it may be made patent to all that the chances for accumulating on the farm are, on an average, vastly in advance of those in other walks of life. Men do not require urging to choose that calling that promises the best results, if only assured which it is.

3. Many leave the farm from a false estimate of the *dignity* and *value* of labour.

Numbers associate gentility with idleness; aristocracy with unstained labour marks; and position with the whiteness and softness of the hands. There is too much of this in the estimate which many of the youth of the farm life of to-day place upon both its dignity and value, especially when brought up surrounded by affluence, and we roundly say that the parents are mainly to blame. The father will not allow his son to perform sundry classes of farm labour, the careful toiling at which himself helped to enrich him; and the mother will not allow her daughter to bake bread, nor to enter the dairy, although her own hands have grown strong and useful through the performance of these duties.

The semblance of this gradation being once established, it becomes infectious. The idea that some classes of farm labour are beneath one, soon rapidly extends in its application, and thus all the labour of farm life is looked upon as undignified. Why should it be considered as undignified to toil, when the first man toiled in sinlessness; and more especially since the irrevocable fiat has gone forth, that man must earn his bread by the "sweat of his brow." Who ever yet reversed high heaven's decree and prospered?

See the true *dignity* of labour. It consists in adjusting itself to the conditions and requirements of its surroundings. If placed by Providence in a counting-house there is great dignity in wielding the pen well; if in a manufacturing shop, in turning out the best article that we can; if on a farm, to perform every duty well, from the cleaning of a stable, when necessary, to superintending the duties of a levee day; and if in a hall of legislation, in using our powers of mind and speech to the utmost in the interests of our country. All the great and the good of olden as well as of modern days, have been dignified by labour, not labour dignified by them. Only in one instance has labour been ennobled by its performance in the world's long history: when it was done by Him who is more than man, around fair Galilee. Who of all that long array of existences that have prided themselves in genteel idleness, has lessened by one drop the world's cup brimful of sorrow, or succeeded in chronicling his oblivious name in the records of enduring story, unless some puppet kings whose rememberance is their shame.

See the *value* of labour. Like the soil that feeds the hand that it tills, labour strengthens the arm that performs it. She imparts to all her sons that enduring vigour that enables them to secure at least a competence, to enjoy aright the hours of repose, and to shun those vices that precipitate the idle into hopeless ruin. Impress the young with the truth that labour is one mark of true nobility, even manual labour, and a great point is gained. Inure our sons and daughters to labour from early years, and they will learn not to despise it; but let us make certain it is labour suited to their capacities. It is inhuman to place young children at work beyond their strength, or even to allow of their toiling thus, as they sometimes wish to do.

The manual labour of the farm is oftentimes severe, but grasping men have made it more so, by urging undue haste, and extending the hours of labour beyond all reasonable requirements, especially in the summer season. The question of *hours* we shall not discuss here, but simply remark that unless some modification in this respect is made, the difficulty in securing workhands will continually increase, and also the difficulty in retaining the services of even willing sons. Thus it is that many labourers leave the country, as the shorter hours of toil in the town are definitely fixed. This scarcety of labour throws on additional burden on the farmer's sons; hence, in a measure, their anxiety to escape what to them seems a species of slavery. The curse of manual labour consists in protracting toil till it becomes positive painful weariness, which matter is usually in the farmer's own hands. The severity of this species of labour is very much lessened by the improvements of recent years in farm machinery. These improvements are still being carried on in a geometrical ratio of progression, insomuch that one hundred years hence all the more laborious parts of farm labour will in all probability be performed by horses and machinery.

In the meantime let farmers impress upon their sons that moderate labour is not oppressive nor undignified, but a source of positive pleasure and gain in many ways, giving to its votaries a satisfactory enjoyment such as the idler never knows; and especially let mothers make them feel that they esteem labour on the farm quite equal in dignity to labour behind the counter, or in the workshop of the machinist.

But is the labour of the business man more dignified than that of the farmer? We say no, emphatically no! We have already shewn that farming is the noblest even of the sciences, and by far the most exhaustive in the scope it gives to the highest use of intellect. Which of the sciences may not be profitably used in prosecuting its researches, and when will that day have arrived when men shall have learned the alphabet even of its highest attainments? We answer, not till long centuries have rolled away. Why, then, should the toil of a purely mechanical performance, such as weighing tea, always by the same rule and under the same conditions, be placed in point of dignity ahead of this fair science, where giants lose their depth often at a first plunge in their researches? Or, why should even the toils of the wholesale dry goods merchant, whose skill mainly consists in buying

goods and selling them at a margin, be looked upon as being more honourable? The successful speculator accumulates much more rapidly than the farmer, but this by no means proves that his efforts to get gain are more dignified. The truth is, that as a public benefactor, the farmer is a king compared *with* him.

Is the labour of the business man lighter? In one sense it may be. It may require less of physical toil, but think of the offset—worry, care, the constant, ceaseless exertion called forth by close competition. Hence it is that farmers usually outwear men of business.

How amusing the breastworks of position behind which mankind entrench themselves, and which are allowed to stand by the sanctions of society. The housemaid deems herself above the cook, the cook looks down upon the shopgirl who has fled the farm to live upon starvation wages; while the shopgirl in turn looks down upon the lass who still labours on the farm, although in regard to true comforts the latter is a queen compared to her. So in the various other lines. The drygoods man is beyond the grocer, the grocer beyond the man with second-hand wares, and the bank clerk beyond them all; while these make common cause in looking down from their self-exalted pedestals upon the patient plodding sons of toil on the farm. Never mind, ye sons of labour, lift up your heads; face duty bravely, and your worth will be acknowledged when all scorners shall have met a merited oblivion.

4. The professions offer a *premium* on *talent*, and thus lure those from the farm who can least be spared—the brightest of her youthful sons.

While it is true that in the forest the tallest trees are found, so in the city the giant minds, yet, were not these in almost every instance nurtured in the country, and transplanted, when young and vigorous, within the limits of the town. The fresh air and manual toil of the country seem to produce a vigour of constitution, and correspondent inherent strength of intellect, such as the city usually fails to yield. Hence it is the professions are mainly fed from the ranks of the sons of the soil. Inducement leads them to go, but sadder still, they are too often urged to go, by those who should advise them to remain. The high fees paid professional men of the first rank, and their rapid accumulations form an irresistable attraction. The mass of these are lost sight of amid the dazzling glare, as they toil and struggle for respectable position and a piece of bread, which is eaten with that carefulness that a farmer seldom knows.

The professions hitherto (less so now), have formed the stepping stones to preferment. Almost every public office was for a time conferred upon some professional man, not only in the town but also in the country itself. Not only in the Legislature, but even in the departments of Agriculture, representative men were chosen from the professions. With this splendid bribe before him, why should the ambitious farmer's son be blamed for treading the short-cut to position, rather than wait long years to wrench public respect from men, through inherent strength of talent, in a channel where this was seldom sought or given.

The idea of position, whether true or not true, forms a powerful attraction. The number in the professions must always, from the nature of the case, be comparatively limited, therefore, there most successful men will always, prove a centre of attraction. For instance, the individuality of a young man of good parts who takes up his position in a village, as its only physician, must be a different thing from the individuality of the same man—a farmer—surrounded by a hundred other farmers, many of them equally talented with himself. Mothers, in the country, feel the force of this, and, when ambitious, urge their sons to leave the calling of their fathers for some professional line.

This idea grows up with them from infancy, since their earliest maternal lessons point in this direction. It forms the constant dream of their youth. Their brothers, less favoured by nature, grow at the same time with the idea that they are only fitted for the hard labour of the farm. These latter step over the threshold of home, with their self-reliance corroded by this pernicious teaching. And all this is a sore evil. If agriculture is the most important interest in the country—and this is acknowledged on all hands—it is clear then, that the very highest order of talent should direct it, and that whatever tends to divert this into another channel, is nothing short of a public calamity.

The remedy here, though clear enough, is not so easily applied; for so long as the

professions offer a premium on talent in the directions indicated, they will command it. So long as these are the stepping-stones to preferment, the brightest of our youthful rural sons will look in that direction; and so long as the present views obtain regarding position amongst our farmers' wives, and even amongst too many of our farmers, the flower of their sons will look in that direction.

A partial remedy, at least, will be found, in public opinion crying against that species of exaction, that enables professional men to extort from the party seeking his services, an unreasonable fee. Public opinion is a mighty lever when rightly wielded. Of course professional men should be well paid, but why extravagantly? Another consists in so educating farmers' sons, that they will be less dependant on the professions, for the minor details of professional work, although we do not strongly advocate the diverting of one man's attention into too many channels. Highest excellence is only attained by concentrating the powers. In regard to preferment the remedy is in the hands of farmers themselves. Of course it would not be wise to make a representative man of an incapable farmer, to the exclusion of a capable professional man; but, it is only reasonable that of two men equally capable, farmers should give the preference to the capable man from their own ranks.

Some may object that the proportion of capable farmers is relatively small. This we do not believe. The proportion of obtrusive office-seekers amongst farmers is small, but this by no means proves that farmers have relatively few capable men amongst them. If such were true, it would form no just ground for reproach. The only wonder is that so many capable men are left. Try any calling by the same test, put any one of them through the same crucible, and which of them would long survive the ordeal? With the constant skimming of the past, the wonder is that any cream is left. If it be true that farmers are deficient in representative material, it forms the strongest argument as to why the youthful ornaments of farm life should remain on the farm. It only enhances the likelihood of this class to receive preferment, where the ground is so unoccupied.

In regard to the popular idea of the individuality of position given by the professions and homage paid to this in the past, there is surely something wrong, and the sooner farm matrons perceive this the better. Education will elevate any calling, and secure for it respect, and just so soon as a large proportion of that talent which is now sent to the professions is retained at home, then will that homage be paid to farming, which it has never hitherto secured. Although the present tendency is as yet to drift away from the farm in increasing numbers, there are already indications of a revulsion of public feeling in this respect, the first faint glimmering of a brighter day. Farmers are already reaping the first fruits in the return of a class most sorely needed, the highly educated, as not a few graduates in Arts at our universities are of late years deciding for the farm. The college roll for the year 1882, at the Ontario Agricultural College, Guelph, numbers 206 students. Through the kindness of a reliable and painstaking student, we have been enabled to ascertain the callings of the parents of 113 of these. Sixty-six of the 113 came from the farm and forty-seven from other pursuits, showing conclusively, that if farmers do not sufficiently value their own calling, it is becoming highly appreciated by the parents of other classes. Would it not be surprising if, in a few years, farming should become as popular as it is now depreciated?

This, and nothing less, farmers have in their own hands. The evil, however, would in the meantime be much mitigated, if farmers, in choosing callings for their sons, or, better still, in encouraging them to choose for themselves, would urge upon the most brilliant of them at least to stay on the farm. They have widest scope for the exercise of talent without limit on the farm, and in a field that if rightly exercised may secure for them lasting renown, and the deserved gratitude of numbers yet unborn.

5. Farmers can give their sons an education fitting them for professional life, at a *less cost* than they can purchase for them a farm. Hence the reason for many of them leaving the farm.

The economical young man will require from $1,200 to $1,500 to enable him to graduate either in Arts or in any of the professions, after his preliminary course has been completed. This, the father can afford more easily than purchasing a farm of 100 acres, which, in Ontario, will cost from $3,000 to $10,000. The graduate is considered equipped

and in a position to shift for himself; the sanctions of society placing him on quite as good a footing socially and otherwise, if not better, than if he had been set up on the farm as above. A well-to-do farmer then, can educate two or three sons for the sum that would be required to place them on a farm. Here, we must confess, comes in a difficulty which it is only fitting that we should frankly acknowledge. So long as farmers can put their sons on what is considered an equally good footing for $1,200 or $1,500, as in another line at an expenditure of from $3,000 to $10,000, they will be most prone to do so. Why the farmer's son should not require an equally costly education, or nearly so, to make him a brilliant success with the professional man we fail to see. Admitting this only increases the difficulty, for, after the education, the farm is still required, which enhances the cost of equipping the son, by the cost of the education. Some say, "Buy lands cheaply out west." We object that we must meet conditions as they are. Others say, "Let the education go." Decidedly no, for then farmers grope on under the ban of the stigma of past years—that of being "an ignorant people." And yet others, "Give the youth an education and let him earn the farm as did his fathers." We reply, the father purchased land for, it may be, $2 an acre. He must now pay $50 per acre. Besides, it would not be seemly for a graduate to labour as a farm hand, at, say $200 per annum and board, when his services would readily command, in other lines. from $600 to $1,200 per annum. Herein lies a difficulty, and, while we have tried to face it, we must acknowledge our inability to get over it gracefully.

A partial remedy, however, we submit, which will most likely be adopted when the country is ripe for it. Where there is but one son there need be no difficulty, as that father would seem to act almost criminally who urged his only son to choose another calling unless for exceptional reasons. Nor need there be great difficulty where there are but two or even three sons; as, in such a case, two or three lines of farming might be carried on, each under the supervision of one son. The workhands employed would then be directly under the eye of an interested party, and the business in this way carried on more energetically and economically than when directed solely by one whose attention was much divided. The only difficulty here is that tendency amongst friends to disagree, especially after having become established in homes of their own. Were it not for this tendency much more could also be realized from carrying on even one line in this same way. No labour need then be done in a slovenly manner from want of proper supervision. The productive capacity of our lands it is not easy to estimate; and, though we do not advocate cutting up stock farms into small parcels, their productiveness might be greatly increased by placing upon them two or more of the same family, who had but the good sense to quit themselves like brethren. Or where the farm is large and suitable, the lines might be more clearly drawn; one portion of it made a fruit farm, another a stock farm, and yet a third portion a grain farm; placed independently in the hands of different sons according to their respective tastes. Where separation is considered better, however, then let the father educate the sons, assist them in getting a start on a farm, and for the rest, let them trust to their own resources of muscle and will.

6. Numbers leave the farm being *dazzled* by the *false glitter of appearances.*

"Things are not always what they seem," says one. Doubly true when farm life is compared with life in the town. Usually the most repelling aspects of farm life come to the front, while the most attractive views of city life are found upon its surface. The homely dress, plain equipage, hard, continuous, and sometimes disagreeable labours of the farm, occupy a prominent place in the mind of the observer. The freshness of the air that nerves the farm youth with an iron frame, the capacity for labour, and to enjoy food and rest, and that almost entire absence of worry and vexations that characterize the business life, are all too seldom perceived; while that happy sense of independant freedom is too little valued till it is fled from. The restless youth, accustomed only to the monotony and drudgery of farm life (too many make it thus), cannot fail to have his attention arrested by the constant excitements of the town; the showy equipage, the stately dress, the apparently light labours, and the active, sprightly step of the business man. Longings are awakened within him to exchange all the dull monotony of the past for what seems so much more congenial. As yet he has not perceived the canker-worm of discontent and rivalry, the overstrain of mental wear and of incessant worry and

anxiety, that so constantly gnaws at the peace of many townsmen. He snaps the cord that tied him to the most comfortable of all the callings, and plunges into the charming whirlpool of business life.

He is dazzled by *equipage* and *dress*. While it is true that the style of a man's equipage and dress has not a little to do with the prestige he carries at the first, it is just as true that it is only one of the accidents of life; and that the true secret of appropriate dress consists in adapting it to one's calling. The farmer does appear somewhat plain besides the shopman, but what of that? He is surely none the less deserving of respect. Folly in dress is never more clearly shown than when in its cost it is out of keeping with the work for which intended. The farmer should not fancy that though he brush against the townsmen in a much richer garb, that the latter esteems him one whit the less, if a sensible man; if not, he then can well afford to do without such regard. If faithless here, we should like to see the farmer try an experiment: Let him dress up as a shopman's clerk, and drive a load of wheat to the market in kid gloves, and in this way ascertain how much respect he will secure. One experiment will suffice. The intelligent townsman knows that one day at farm labour would forever ruin a suit of broadcloth. It is not the plain dress of the farmer at which the townsman smiles. It is the unpardonable lack of neatness and boorishness of manner exhibited in circumstances that do not call for these. In regard to equipage the same rule applies.

And then in regard to light work. Let not the young man of the farm be deceived. The hours that many shopmen spend on duty are longer even than those of the farm, and within the dingy walls of a prison when compared to the glorious light and freedom of labours on the farm.

But look more deeply beneath the surface. Think of that constant mental strain and unceasing tax upon the powers of mind that so often turns the hair of the business man prematurely grey. We have already stated that it is almost certain that one out of every two who embark on the perilous sea of business will go down amid disaster. Think not these usually go down without a struggle. Nothing of the kind. There is usually a brave stand made to keep afloat; a determined gallant fight, which, as the inevitable wreck draws near, reminds one of the heroism of despair. There is, perhaps, in one of those brave struggles, compressed more of anxiety and business worry and mental sorrow than a score of farmers ever know. Even in regard to the successful business man; examine narrowly that visage all aglow with the activities of ceaseless unrest, and you do not fail to see traces of care's deep furrows, coming all before their time. The activities to which successful business men accustom themselves might well lead the average farmer to stand amazed when comparing them with his own. The merchant usually applies himself with an intensity unknown to the farmer. So, too, does the manufacturer and the professional man; and though a different class of faculties are used, these are none the less exhausting. If farmers can but convince their sons of the truth of these statements they will think twice before they leave the farm.

7. Many are driven from the farm because of *undue fettering* on the part of the parents. This may consist in (*a*) slavish work; (*b*) not allowing the household a share in the administration of farm affairs; and (*c*) not making due provision for its members, etc.

Oftentimes an over amount of *slavish* work is exacted. It is a sad reproach on the profession that very many in rural districts seem to consider their own sons and daughters working machines. This is amply testified in the stooping shoulders and stiff ungainly walk of many lads yet in their teens. The bouyant spirits that give elasticity and sprightliness to youthful life is completely crushed by the avarice of parents, shortsighted as it is cruel, and cruel as unjust. Not that we advocate idleness for the youth of the farm, but labour in proportion to their strength and development. These working machines are treated much on the principle of farm machinery, fed on the principle that machinery is oiled, and housed on the principle that machinery is laid away, not resting even as the horses are allowed to rest. This abominable cruelty is most frequent with those who commence life at the foot of the hill, who prosper through the fruits of hard labour and whose insatiable avarice becomes aroused in consequence. But the more firmly the bow is strung the greater its rebound. The more violent the swing of the pendulum the more surely will it oscillate past the perpendicular. Action produces in every

case corresponding reaction, and just in proportion to its strength. So is it with all forms of oppression. The pulses of discontent soon beat so strongly that one by one the inmates of the homestead forsake it for shortened hours and less oppressive toils. The farmer's plans are disarranged. His remaining purposes unfulfilled. Morose, sullen, misanthropic and soured, his sun that might have set amid a flood of evening glories, goes down amid the mutterings of the stormcloud and the blackness of forbidding night.

The remedy here is plain: Treat the sons of the farm as such. Cease to make their lives one unremitting grind. Give them not only sufficient relaxation, but provide them with the means of wholesome entertainment during such periods of rest.

Then, many practically refuse their sons a share in the administration of the business of the farm. We think this partially accounts for the not uncommon fact that observation justifies, that the sons of leading farmers not seldom prove inefficient in point of business tact. In unnumbered instances it has proved a source of blessing to the ambitious youth, that he has been early thrown upon his own resources. Where the father has been successful in farm-life this is not a necessity. The more successful the farmer the more he is disposed naturally to keep his hold on the reins, not heeding the lesson of the eagle in teaching her eaglets to fly. The inexperienced youth becomes anxious to try his strength. Through an inherent love of change some other line of business is chosen, past inexperience and the total lack of business culture render him a failure.

The remedy consists in the farmer's showing early *administrative powers* with his sons, not fearing to practice them in buying and selling, and in marketing, nor yet severely chiding them, if in these things they happen to make a mistake. Let him encourage their experimenting in the production and management of all kinds of crops, though, of course on a limited scale. This latter exercise will greatly foster within them an undying love of the calling that has so much absorbed their attention in early life, the calling that thus becomes so intimately connected with their first failures and triumphs. Give them, when sufficiently matured, the management of different lines. Let one for instance oversee the department of stock or at first one line of it. Another the management of the teams, etc. throughout, the father of course rather increasing than relaxing his vigilance in the general oversight; guiding in this respect with a firm rein, kindly admonishing where he observes a blunder, advising where he sees a week point, curbing where he notices the first tendency to extravagance, and above all temperately commending where commendation is due. The youth of the farm would in this way be trained in the art of management, that best of all schools, experience, and under conditions of such a nature that mistakes might easily be rectified without the danger of incurring financial disaster. The tendency, too, to run away from a calling in which apprenticeship had thus been served would be reduced to a minimum.

The farmer not making *provision* sufficiently early for the future of his family is oftentimes a sore evil. It affects and falls more heavily upon the daughters even than on the sons. The latter are fitted by nature for stern battling, not so the former. Of course this matters little with those who marry early, but is a very different affair with such as choose not to do so. Usually these latter are kept as hangers on in a state of spirit-crushing dependance, to whom a crumb is thrown now and then by father or brother by way of compensation for the devotion of a large share of a life that has been daily sacrificed upon the altar of their comfort. Why not give them their portion when matured, or at least satisfy them as to what this shall be, even though such is not sought by them. The prospect to a young woman looking forward into life's long journey without a protector must be forlorn enough; but the gloom of this prospect is surely much intensified by the knowledge of the fact that their's shall be a state of abject dependance so long as hey remain beneath a father's roof. But we have to deal with the sons.

But we have not one particle of faith in a farmer's bribing his son to do a piece of work that lies in the path of duty, simply to get it done. Such is ruinous government. But we have strong faith in the parents encouraging a child to labour by promising him a part of the proceeds. It is the part of wisdom in any farmer to give his son distinctly to understand that for labour expended in taking care of sheep and lambs he shall have a share in the proceeds; to be expended, however, not at the dictation, but with the appro-

val of the parents. So let it be in every department of farm life. Give the son a portion of the proceeds arising from his special department, and he will more than repay the giver by increased diligence and carefulness. Then when manhood arrives, if not before, let the father give him clearly to understand his intentions regarding his outfit. Let him enlighten him as to what the nature of his portion shall be, unless there are strong reasons for his not doing so, and as a matter of right, not of favour simply. When the great battle of life is commencing, then it is that assistance is most required, not after position and wealth have been struggled for and won. The good that results from keeping young men toiling on unenlightened in this matter for long years after manhood is reached, we fail to see. If the son marry, the difficulties of division are increased two-fold. Not attending to this matter sufficiently early often leads to painful separations, leaving the father to carry on feebly a business sadly out of joint, and leading the son to commence life anew in some untried sphere. With how much better grace the father can approach the son than the son the father in all matters of such extreme delicacy. "Give me the portion of the goods that falleth unto me" is the natural desire, expressed or otherwise, of every budding youthful breast, and that father who wisely anticipates the expression of this desire will certainly do something toward preventing that exodus from the farm over which we mourn.

8. The lack of *home attractions* cuts the moorings of many, and allows them to drift away from the farm.

It is a difficult matter to expatriate one from a home or calling that he dearly loves. Like that singular weapon of the savage, that, having done its work, returns to the vicinity of him who hurled it, the excursions of rural youth will all end near their starting point if they dearly love their home. Singular the effects of the loved associations of early years, when these are what they ought to be, even on rugged men. The remnant of Zenophon's undaunted "ten thousand," whom the hordes of Persia could not soften, whose ranks were sadly thinned by the snows of Cappadocia, gaunt famine, and savage foemen, immortal in their retreat, wept like women when they caught sight of the sea, beyond which lay their homes. The loom of a rightly-ordered home weaves silken cords that bind the young to its precincts far stronger than the alluring power of enticements to draw them away. Although, even with most on the farm, the day of home separation comes; yet where the attractions have been deep and strong the inclination is to choose the calling with which such associations have been connected. In the departed days of chivalry, the heroic age, the proudest aspiration of the son was to wear the sword of his father; and so when farming is given its rightful place amongst earth's callings, will it be the proudest aspiration of a son to till the lands of his father. That golden day is dawning and will be ushered in so soon as the farmer convinces the world that he is not a mere labour machine, nay, that his calling gives wider scope to the exercise of the whole sweep of intellect than any calling under heaven. This he will accomplish so soon as the floodgates of the exodus of the most talented of his sons are closed toward the professions. Talent rightly directed will command repect and will elevate any calling claiming its energies.

And how shall these *home-attractions* be made deep and strong?

Our way of accomplishing this is by adorning our homes. This implies variety, the opposite of monotonous uniformity, in the construction of our dwellings and their surroundings, creating something distinctive about the place of which each inmate will be proud. One would almost fancy, in passing through some sections, that the houses had all been planned by the one architect, and he by no means an expert, and that the tastes which called for these had been all cast in the same mould, so little is there distinctive in their general design. It is not necessary that there be large outlay to secure these home-adornments. Nothing of the kind! A man of taste will produce neatness and attractiveness, place him where you may. The great difficulty lies in the lack of taste. It reflects sadly on the wisdom of our farmers that so many of them cultivate well their fields, who utterly neglect all culture of the love of the beautiful. Like the "lonely man" of the Scottish bard walking amid the pillars of a once beautiful temple, they walk solitary amid a constant flood of nature's surrounding glories, making none of them their own.

Let there then be neatness in farm-dwellings and out-buildings as well as variety, and also in their surroundings, all of which may be, without necessitating large outlay in one instance. Just a smooth level lawn with a few graceful trees in front adorn any home. If flower beds are added, these of course add to its beauty, but not so much as they usually add to the moral loveliness of the youthful inmates. Indoor plants always speak more or less of refinement within. Every son feels prouder of such a home, than one where the pigs and poultry unite in making common cause in carrying out the destructive propensities of their instincts in the door-yard. This plot should be neatly fenced or hedged. It will be found much more profitable to entertain there the youthful inmates of the dwelling than to turn a spot so sacred into a battle-ground for pigs, dogs, cats and poultry.

A *second* way is to exact less labour from the sons, especially if willing workers. Let time be given them to exercise their powers of mind, as well as powers of muscle, and let them be impressed that the former is equally a duty. Let them be given time to read, as well as opportunity. We hold it is a stigma on the 170,000 farmers of Ontario, who take no farm paper, that such is the case. How do they expect their sons to become intelligent in the calling of their fathers? A young man naturally flees from a calling, especially if he feels that other callings exacts less of labour, and provide more of food for the mental man. Experience has shown the necessity of farmers actively prosecuting labour, and also their households if they wish to be successful, and of exercising a constant vigilance over every department of their affairs. But where, we ask, is the reason or wisdom in exacting from the human body that number of hours of toil which it cannot give? In regard to the matured, this is of more than doubtful wisdom, in regard to the young, it is positive cruelty. We by no means advocate idleness in children. Let service be required of them every day, but of such a nature that its severity will not unduly tax their young limbs, and create within them a loathing of all labour. Let them be allowed time for relaxation, at the same time a close but not fettering eye being kept as to the way this is spent. Foster a love of reading and reflection, especially on agricultural topics. Let a plot of ground be given to every child of the home, however small that child may be, and let the proceeds all be theirs.

A *third* way. Let the farmer stop that everlasting grumble about the evils of his calling, especially in the presence of his wife and children. Why is it that the farmer is proverbial for his grumbling? Why is he constantly fearing drought, or too much rain; too much heat, or too much cold? Why does he so often express the fear that "starvation is coming," or that the "taxes" will not be realized from this year's profit? Why is he slow to learn wisdom from the "lilies" of the field? Like the prince of the Apostles, let him "magnify" his calling in the presence of all his household, and show by his happy contented bearing, that he enjoys himself in it. Who could find fault with a son for bidding an eternal farewell to a calling, that, from the father's own confessions, kept him constantly in hot water.

A *fourth* way. Let the farmer see to it that she who "left the world" for him is not ground down by unremitting labour. After all, the home in all that is most precious within it is the work of the mother. But if her life is a constant struggle with oppressive drudgery, how can she either find time, or command the spirit to make it what it should be? How can she love that calling that is sapping all her strength? And why should she tell her children to love it? Let farmers' wives receive more sympathy and assistance in their too often hard lot, and fewer farmers' sons will flee that calling which needlessly makes drudges of their mothers.

A *fifth* way is for farmers to take their children into their confidence, and talk with them of their affairs in a consulting advisatory way, encouraging them in offering suggestions, taking care at the same time to reserve to themselves as heads of the household, the right of decision, even with sons well grown. A well trained son will always gracefully submit in such a case.

Farmers, talk freely to your children about your calling. This will increase their interest in it, and their love for it, and very much enhance the pleasantness of family relations. Never speak disparagingly of it in their presence, when comparing it with other callings, unless there is the clearest necessity for doing so. All this may sound

like trouble, but, it is trouble that repays at least a thousand-fold. There is no expenditure that brings along with it so rich a harvest as that which is devoted to the welfare of the household.

To farm matrons we desire to say, and we trust that all the newspapers and all the husbands in the land will re-echo the statement: Do stop saying of the brightest of your sons in the presence of the less bright, that this one must be a "lawyer," that one a "doctor," and a third an "engineer;" then by way of contrast as it were, saying of a fourth, with feebler development, "this one will do for a farmer." You do not respect your own calling sufficiently, or you would not speak thus. You are at least half-ashamed of your position as a farmer's wife, when you thus belittle in the minds of your children your husband's calling. So soon as farm matrons shall have been persuaded of the folly of this, just so soon will the evil be removed in its beginnings. Mothers can persuade their sons to respect which calling they please, hence, till with something like common consent, they advise their sons to choose the calling of their husdands, agricultural societies will advertise in vain for essays that can in any other way effectively check the increasing tendency of the times for farmers' sons to leave the calling of their fathers for other pursuits.

ESSAY ON THE INCREASING TENDENCY OF THE TIMES FOR FARMERS' SONS TO LEAVE THE OCCUPATION OF THEIR FATHERS FOR OTHER PURSUITS: ITS CAUSE AND REMEDIES.

By H. F. Honsberger, Springfield.

To which was awarded the Second Prize by the Agricultural and Arts Association.

It is a deplorable fact, that there is a growing tendency among farmers' sons to abandon agriculture for other pursuits. In this, as in everything else, the rule holds good, that there never is an effect without a cause, and it is high time that the farmers of this country and all who are interested in agriculture, should give the subject their serious attention, and, if possible, bring about such a reform as will check the evil. That the evil is on the increase is painfully apparent, and we see the disastrous results in nearly every neighbourhood. Numerous cases have come under my observation where successful farmers have worked hard to pay for farms which they hoped to bequeath to their sons, only to be deserted when the sons became of age, or perhaps even before; and left to pass the rest of their days alone on the old homestead, or sell the property so dear to them, and for which they had laboured so faithfully, expecting to enjoy the reward of their labours in their old age with their children about them. I do not agree with the opinion of some persons, who claim, that the farmer's son should invariably follow the occupation of his father; believing, as I do, that every person should be engaged in that occupation for which he is best adapted mentally and physically. It is unreasonable to think that all farmers' sons should be farmers, for there are many instances where the sons of farmers have gained the greatest distinction, and been most successful in the learned professions, and as merchants and mechanics. But it is a matter of regret that hundreds of young men are leaving the farm every year to engage in other pursuits for which they are not adapted, only to experience that they have made a great mistake after meeting with a complete failure.

As a farmer's son, and a lover of the occupation, I have frequently conversed upon the subject with young men who have abandoned agriculture for various other pursuits, and inquired of them their reasons for leaving the occupation for which they were most fitted by the surroundings of their youthful days, and wherein there appeared to be the brightest prospects of success, to engage in other pursuits. From my own experience, and from the replies which I invariably received to my enquiries, I feel justified in saying, that the farmers of the country are chiefly to blame for the great exodus of farmers' sons to the already overcrowded cities. The following are a few of the chief reasons given by

the sons of farmers for becoming dissatisfied with the occupation, and leaving it for other pursuits which seem to be more in harmony with their tastes and desires, namely : The lack of social advantage in rural districts ; the want of ambition and enterprise among farmers, and the small inducements which the occupation offers for the acquiring of wealth.

Now, it is an undeniable fact, that the most intelligent, energetic and ambitious youths of nearly every rural district, are generally the first to abandon agriculture and enter upon some other occupation. The majority of the male teachers of this country are farmers' sons, and it is not an uncommon thing to see a young man leave the farm to prepare himself for teaching, and after following that profession for a few years, to enter upon the study of law or medicine. To their credit be it said, that in many instances the sons of farmers who have worked their way up in this manner, have been very successful in their chosen professions, and occupy prominent positions. But it is a matter of regret that the farmers' sons who possess the greatest abilities, and who are able to achieve such great success in other pursuits, cannot be induced to put forth their energies for the advancement of agriculture ; and this fact alone proves the necessity of a change in the mode of agriculture and in the life of a farmer. How often we see a young man leaving a comfortable home on a farm to accept a petty clerkship in an office or store, where, by hard work, he is scarcely enabled to pay for his food and clothing, thus showing that there is something lacking in the life of a farmer, that induces him to undergo such privations. Let us then examine closely the reasons for leaving the farm, which I have already mentioned as being frequently given by farmers' sons, to find if there is not too much truth in them ; and if possible, devise means to bring about such a change in the occupation and life of a farmer, as will check the evil which is at present robbing the farming community of its best blood, and causing disappointment to many parents who see their sons leaving the occupation and homes that they love.

Perhaps there is nothing which has a greater tendency to drive a young man from the farm than the lack of social advantages which he experiences, in contrast with the whirl and restless activity of society in the cities. He contrasts his quiet and monotonous life with the never-ceasing bustle and costly pleasure of the city, and imagines, that, if living amidst such scenes and pleasures, his would be a life of perfect happiness.

Little does he think, until he has learned it by experience, that many who are living in the cities, and whose lot he now envies, are sighing for the rest and quietude which he despises. Although, I admit, that there is danger of falling into the other extreme, as is the case in most cities, where the pleasures of society are indulged in to so great an extent by many persons, as to bring upon them financial ruin, yet it is very apparent that the claims of society are almost forgotten in many rural districts. Many farmers appear to be ignorant of the fact that they and their children have minds as well as bodies ; and that in order to insure happiness, and contentment, it is necessary to develop and provide for the wants of the mind as well as for the body. We cannot wonder that the children of many of our farmers are discontented, and resolve to abandon the home of their fathers, when we consider the life they are leading. How often we see farmers who own large farms, and yet deny their children the social advantages for which their hearts yearn, while they are urged to put forth all their energies and powers to add acre to acre, and increase their possessions. We must acknowledge, that the city possesses certain social advantages which are not found in the rural districts, owing to the fact that our farm houses must necessarily be isolated from those of our neighbours. This a drawback to society and has a great tendency to make young persons dissatisfied with country life. Although this advantage is being remedied to a great extent as the country is becoming more thickly settled, yet there is still room for a vast improvement. Farmers and their families need recreation and social enjoyments as much as persons living in the cities ; and I am satisfied that this want, as experienced in many localities, has caused many young men to leave the farm. How many farmers and their families work from Monday morning until Saturday night, without anything to break the monotony except the time allotted for meals, sleep and rest. Can we wonder that young people who live in such localities tell us that the life of a farmer is dull and monotonous? We should strive to procure for ourselves the advantages of the city as much as possible, without bringing with them its

vices and sins; and there is no reason why the inhabitants of rural districts should not enjoy the advantages of lectures, concerts, and other entertainments, which are so numerous in the cities, and lend to them the charms which entice so many of our farmers' sons, who feel the want of amusements and pronounce country life dull and unattractive.

The want of ambition and enterprise among farmers, also has a great tendency to make agriculture unpopular with the rising generation.

Although agriculture has made rapid strides within the last quarter of a century, and there is a marked improvement in the cultivation of the soil and the raising of stock, yet it has not yet attained that prominent position which it should occupy. Again I must censure the farmers for not looking after their own interests. A great number of the ambitious youths of the present day—and there are not a few of them among the sons of farmers, in this enlightened age, when the advantages of education are within the reach of every boy—imagine that in order to distinguish themselves they must enter the professions. Now there is not a more noble pursuit than agriculture; nor one in which there are greater opportunities for gaining distinction, and yet how few farmers there are who take that pride in their calling which is evinced by persons engaged in many other pursuits. Examine the course pursued by the lawyer or doctor, and see how he strives to push himself forward and gain an honourable position at the head of his profession; watch the career of the merchant and see how closely he applies himself to every detail of his business, and what efforts he makes to surpass his rivals in the strife for wealth and fame; notice with what diligence the mechanic labours to excel in his own calling. It is an old saying that "opposition is the life of trade," and I think it may safely be said that a little more opposition and rivalry among farmers would infuse new life into agriculture, and make the calling more attractive. This is an age of progress and improvement, and if we, as farmers, do not keep pace with the spirit of the times, we need not think it strange that young men abandon agriculture for other pursuits. A glance at our Agricultural College will prove the truth of my statements.

When we consider that this is an agricultural country, and that the great majority of the inhabitants are engaged in agriculture, the fact that so few farmers avail themselves of the advantages which that institution offers for imparting a thorough knowledge of their occupation, by sending their sons, is of itself sufficient proof that there is a lack of ambition and enterprise among our farmers. While the young man who aspires for success and fame in a profession, or in mercantile pursuits, is encouraged by his friends, and urged to prepare himself thoroughly for his life's work, the farmer's son, who is ambitious and wishes to gain a thorough knowledge of agriculture by attending an agricultural college, is often discouraged and even ridiculed by his friends and neighbours.

A reason very frequently given by farmers' sons for leaving agriculture is that the prospects of becoming wealthy are greater in many other pursuits. Now I admit that there are avocations in which there are greater possibilities of becoming wealthy in a short time; but a little investigation will prove that in those pursuits where fortunes are made most speedily, the risks are far greater than in agriculture, and the number who are successful comparatively far less. Take for example the persons engaged in the mercantile business, and we find that for every one who is successful and amasses a fortune there are many who fail. The same may be said of professional men. A careful examination will show that there is no occupation in which a greater percentage of the number of persons engaged in it, succeed in making a competency, and surround themselves with the comforts of life than agriculture. It is here that a great many farmers' sons deceive themselves.

They watch the career of some person who is eminently successful in another pursuit, and conclude at once that if engaged in the same occupation, they would meet with the same success, without considering for a moment that for everyone who is successful in that occupation there are many who fail. It is customary with many farmers to give their sons no direct interest in the farm until they become of age. They claim that it is as well to have them work for their maintenance until that time, inasmuch as the property will be theirs at some future period, and therefore give them no interest in the proceeds of the farm, and in many cases very little spending money. Although this plan appears quite reasonable to the farmer, yet it is not without serious objections, as it has a tendency to make the sons dissatisfied with the occupation.

They see other young men earning money for themselves, while they are obliged to ask their fathers even for the smallest amount, and conclude that they are not paid for their labour.

If farmers gave their sons an interest in the farm, or at least in some part of it, and encourage them to produce the greatest results from it, it would create in them a love for the occupation, and would prevent many from leaving it.

Other causes might be mentioned which in many cases are instrumental in driving young men from the farm. Among them are the *long hours* which many farmers devote to their labours, the want of home comforts and enjoyments, and the opinion which appears to be fast gaining ground "that manual labour is degrading."

Although the work of the farmer has been very much lessened, and made comparatively easy by the use of labour-saving machinery, yet there are cases where farmers require too much from their sons and farm-servants, by working too early and late. It is true that at certain seasons the work of the farm is very pressing, and renders it necessary to lengthen the hours of labour.

No reasonable person would object to working longer at such times, but we occasionally find farmers who require too much labour at all seasons of the year. This should be avoided as the farmer needs rest and recreation as much as persons engaged in other pursuits, who have their regular hours of labour.

Perhaps there is no class of young men whose choice of occupation and future careers depend in so great a measure upon the influence and surroundings of their homes, as the sons of farmers. This is chiefly owing to the fact that the farmer's son spends his evenings at home, while the young men of the cities attend some of the numerous places of amusement which invite their attention. How important then, and how essential it is to the happiness of the household, that the farmer's home should possess everything to make it comfortable and attractive. When speaking of *home*, I speak of it in the broadest sense of the word—not only as the spot where the members of the family gather around the table to satisfy the cravings of their appetites, or assemble at night to enjoy the blessings of rest and sleep—but the place where parents and children meet when released from their labours, to enjoy each other's society, to receive parental instruction and advice, to improve their minds by reading and study—in short to share the joys which can only be found in a happy and well-governed home. I think I am safe in saying that the want of a comfortable and attractive home has caused many a young man to leave the farm and engage in something else in the city. A glance at some of our farmers' homes cannot fail to convince us that there is room for improvement in this respect. How often we see wealthy farmers who own large farms, and spare no pains or expense in making any improvements that will increase their gains, and yet pay very little attention to the comfort and beauty of their homes. We cannot sympathize with the farmer, who, after adopting such a course, finds his sons deserting the farm, while he is left alone to repent his folly, as the result is nothing more than what might reasonably be expected.

There is no reason why the farmer's home should not be well furnished with papers, books, music, and everything necessary for the comfort of the family, and the improvement of their minds; and there surely is no excuse for the bleak and unattractive appearance of many of our farm houses and their surroundings, when a few trees and a little time spent in laying out grounds would add so much to the beauty and value of the place.

It is very apparent that there is an increasing tendency for the youth of the present day to look upon manual labour as degrading, and to enter upon those pursuits which require the exercise of the mental powers.

Thus we find that the farm and the workshop are deserted, while the office and counting-house are filled with young men who look upon manual labour with contempt, and tell us "that they intend to earn a living by the labour of their minds, instead of their hands."

This state of affairs has increased to an alarming extent, and it behooves us to inquire into the causes of the evil, and if possible remove them.

Some persons claim that it may easily be accounted for, and tell us that it is owing to the fact that the young men of the present day are more indolent than their forefathers

were. This is a mistaken idea, for we frequently see a young man leave a home on the farm where his duties are very light, to accept a position in an office or store where his employment is far more confining and wearisome than farm work.

I will venture to say that there are many farmers' sons, engaged in the confining and monotonous labour of some office or store, who long for the freedom which they enjoyed in their country homes, but remain at their chosen work, because they labour under the erroneous idea that their occupation is more noble than that of a farmer. And can we say that their belief is without foundation?

We answer, No! for we must acknowledge that such an opinion does exist. The question then arises, "What is the cause of the foolish idea, entertained by many, that the person who is engaged in manual labour holds a position in society inferior to that of the person who follows a profession, and earns his livelihood by the exercise of his mental faculties"? A careful examination will show that there are a variety of causes which tend to foster this erroneous idea; and the sooner we bring about a complete revolution in this respect, the better for mankind in general, and more especially for the farming community.

Unlike other causes which I have already mentioned as having a tendency to make the farmer's son dissatisfied with the occupation of his father, this cannot be remedied by the farmers alone, unless they receive the co-operation of other agencies that wield a powerful influence in moulding the opinions of the people in regard to the dignity of labour. The day is past when bone and muscle were the great essentials of the farmer, and it is very evident that we must introduce more brain-work into our farming operations, in order to produce the greatest result from our labour, and show our young men that it is not necessary for the mind to remain inactive while engaged in agriculture, but that there is no pursuit in which greater progress and increased financial gains can be made by combining the labours of an active, intelligent and cultivated mind with industry and perseverance, than in farming.

Farmers, as a rule, are not proud enough of their occupation, and many of them are quite willing to show by their actions and words that they consider themselves socially and intellectually, inferior to persons engaged in many other pursuits. How often we hear words similar to the following from the lips of a farmer when buying an article of clothing from the merchant, "This is good enough for a farmer—you know we cannot wear such fine clothes as persons living in the city." In summing up the amount of his bill, he is very ready to acknowledge the merchant's superiority, by leaving the matter wholly in his hands, and adding, "We farmers do not require much education in our occupation."

What does the farmer's son conclude, who is perhaps a silent listener to a conversation like the above? He resolves, that when he is a man he will cast his lot with the class of whom his father speaks in such complimentary terms. The above are a few of many instances that might be given to prove the truth of my assertions. There is an old saying that "if you wish to be respected by others, you must respect yourself," and a great many farmers might learn an important lesson from it.

No one will deny that the "Press" exerts a mighty influence in bringing about any reform, and a great many writers are doing their duty nobly, by speaking of the dignity of labour, and pointing out the evil effects of looking with contempt upon manual labour, and the desire of young men to abandon it for the so-called genteel employment of the learned professions. But there is still a great work before them, which demands the earnest attention of every educator of public opinion who has the welfare of the rising generation at heart.

Before giving the remedies which I would suggest for bringing about the desired change in the life of a farmer, and preventing our young men from leaving the occupation for other pursuits, I wish to correct an erroneous idea which is entertained by many who claim that it is the direct and only cause of the evil. A certain class of persons—but happily their numbers are few—tell us that the progress and diffusion of education are the causes of this increasing tendency. Now, I admit that the possession of a good education in many cases has a tendency to make farmers' sons dissatisfied with the occupation

of their fathers, inasmuch as it opens up the way to them for entering upon some other pursuit, in which a good education is indespensable.

I admit, also, that education and a knowledge of what is going on in the world, excites the ambition of many a farmer's son, and awakens in him a desire to leave the parental roof, and try his fortune in the wide world which appears so bright and promising. It cannot be denied that the farmers' sons who receive the best education are often the first to leave the occupation. Are we then to conclude that the sons of farmers must be kept in ignorance, with minds undeveloped, and without the education which is essential to happiness and success in life, in order to prevent them from leaving the occupation of their fathers? Is the occupation of a farmer so unattractive and unpleasant that none but the ignorant and uncultured can be induced to follow it? Shall we build schools and colleges for the education of the youth of our land, and encourage them to avail themselves of the advantages of learning, and at the same time say to the farmer's son "These advantages are not for you, for while they are of the highest importance to men engaged in other employments, they are a curse to agriculture." Shall we adopt *ignorance* as our motto and the foundation of our success? I feel justified in saying and shall endeavour to prove, not only that education is not detrimental to the agricultural interests, but that the want of it among so many of our farmers, and the lack of that ambition, enterprise, and advancement in the calling, which follow as a result of education, are to a great extent the cause of so many young men leaving the occupation.

I claim that education will in a great measure remove the causes which I have already mentioned as being instrumental in driving young men from the farm. No one will deny that education is the foundation of society, and that it arouses the ambition and energies of the man who possesses it, and enables him to accomplish the greatest results in his calling. A comparison between a rural district where the inhabitants are educated and take a lively interest in their schools, and another where education is neglected, will prove the truth of my statements, for we find that the former possesses the greater social advantages; while the inhabitants are more enterprising and achieve greater success in their occupations. This is so strikingly illustrated in many places as to give origin to the remark that "a neighbourhood may be judged by its schools." Why is it that we find so few farmers among our members of Parliament, and persons in authority? In this country where the great majority of the ratepayers are farmers, it is reasonable to suppose that the majority of the men who make our laws and rule over us should be farmers. We find our halls of legislation filled with lawyers, doctors, and men of various pursuits, but very seldom do we see the faces of the so-called honest farmers among them. Is it because they have not the required ability? We answer in the negative, for the majority of our farmers possess intelligence and judgment of the highest order. It is simply because they have not had the advantages of education. And yet there is a class of farmers who tell us that there is a danger of giving their sons too much education, and thus causing them to abandon agriculture, who will go to the polls and elect a lawyer or a doctor to represent them in Parliament, and grumble until the next election because they are ruled by a class of men who legislate for their own interests, without considering the interests of the farmer.

Let us make agriculture what it *should* be, and the education of farmers' sons will not interfere with the interests of the occupation, but will exert a mighty influence in raising it to that exalted position which it should occupy.

Having pointed out what I consider the chief causes which induce so many farmers' sons to abandon agriculture, I shall give the remedies for the evil which I would suggest, and mark out the course which should be adopted with boys on the farm in order to make them love it. As the impressions formed in youth are very lasting, and exert a life-long influence upon a person, it is very important that the farmers' son should become interested in agriculture and cherish a love for the occupation at an early age, if he is expected to engage in it for his life's work. It appears to be a natural failing with most persons, especially while young, to be dissatisfied with their lot, and imagine that other occupations are more pleasant and profitable.

We cannot wonder then that the young man who has spent all his days on a farm and knows very little about the city except what he hears and reads, has an intense long-

ing to participate in its scenes and pleasures which appear to him so bright and promising. This natural desire for a change leads him to underrate the advantages of his own surroundings, while he pictures to himself, in glowing colours, the pleasures and prospects of the far-off city, of which he knows comparatively little, but thinks only of that which is pleasing and attractive, for with him "'Tis distance lends enchantment to the scene."

Many a farmer's son who has looked only on the bright side of city life, and left his home to engage in something else, has found to his sorrow that he has made a great mistake by over-rating the advantages of the city. We should make agriculture attractive to our youths, and awaken in them an interest in it; while no pains should be spared to surround them with the social advantages which they imagine are so much greater in the cities. Encourage lectures, concerts, farmers' clubs, and other entertainments that will provide social enjoyments for our young men, and show them that it is not necessary to go to the cities in order to share these advantages. Teach them that ours is a noble occupation, and, if possible, give them a thorough knowledge of the most improved methods of agriculture by sending them to an agricultural college. Do not adhere to the old methods because they were practised by our forefathers in years gone by, but avail yourselves of every improvement, and show our young men that we, as farmers, are fully alive to our own interests, and ambitious to excel in our calling. Encourage agricultural societies, and urge your sons to produce the greatest results from the farms, and compete for honours.

Our agricultural societies are not encouraged by farmers as they should be. is the cause of this? It is simply because many farmers do not take enough pride in their calling.

Give the boys an interest in the farm, or at least in some part of it, at an early age —set apart a piece of ground to be cultivated by them, and encourage them in their labours by giving them the proceeds of the crop. This will not only create a love for the occupation, but will give them experience in managing for themselves, and banish the idea which is entertained by many farmers' sons, who work until they become of age without receiving any direct compensation for their labours, and therefore conclude that "farming don't pay." Many of our most successful merchants who see the wisdom of adopting such a course, give their employees a certain interest in the profits of their business, and find that it is to their advantage to do so, as it encourages them to make greater efforts in the discharge of their duties.

Make your homes pleasant and attractive. Many a young man has left the farm who would have remained contented and happy if he had been surrounded by the influences which are found in every happy and attractive home. The comfort and beauty of the farmer's home depend in a great measure upon his wife and daughters, who are generally quite willing to perform their part if they receive the co-operation of the husband and father. The farmer's library should be well supplied with books, among which works on agriculture should occupy a prominent position; while every family should have a paper devoted to agriculture.

Give the farmer's son a good education, which will qualify him to fill any position in the management of our public affairs, paying particular attention to these subjects which are most essential to success in his occupation. Teach him that Agriculture is one of the most noble, independant, and profitable pursuits, and by the adoption of new and improved methods, and by enterprise and ambition in your calling, raise the occupation to that exalted position which it should occupy, and make your influence felt among men engaged in other pursuits. Educate our young men to the fact that manual labour is not degrading, and that the man who toils with his hands may possess as great a mind, and as much culture and refinement, as the man whose occupation requires only the exercise of the mental faculties.

Show the rising generation that the farmers are fully alive to their own interests, and in harmony with the progressive spirit of the times, and we shall soon see our young men aspiring for success and fame in our noble occupation, and hear no more the cry that our farms are being deserted, or see the sad countenances of parents whose sons have left their homes on the farm to engage in other pursuits.

THE INCREASING TENDENCY OF THE TIMES FOR FARMERS' SONS TO LEAVE THE OCCUPATION OF THEIR FATHERS FOR OTHER PURSUITS: ITS CAUSES AND REMEDIES.

By Richard Drury, Barrie.

(This Essay was highly commended by the Judges.)

In considering this subject it may be well to ask ourselves first, what it is that has prompted the Directors of the Agricultural and Arts Association of Ontario to award prizes for essays, the purposes of which are, firstly, to discover the causes of so many farmers' sons forsaking the occupation of their fathers; and, secondly, to prescribe the remedies; or let us endeavour to ascertain the consequences that are likely to follow if nothing is done to impede this growing evil. Let us consider what results are most to be feared if the depletion of our agricultural ranks continues without an effectual effort being made to check it. Is there any reason to fear that the youths of our country, who have been born and reared on the farm, who know its advantages and disadvantages, its amenities and its hardships, and who it is only natural to suppose would choose the calling of their fathers, all things being equal—is there any foundation, we say, for the fear that these youths will continue to desert the agricultural pursuits until this Dominion, which is destined by nature to occupy a foremost position in the world as a competitor in the products of the soil, instead of being exalted to that high standard which her capabilities warrant, is allowed to decline to a fourth or fifth-rate position (speaking comparatively), and there remain for an extended period of time? We do not believe that there is any great danger of the evil reaching such proportions, because we think that one of the chief causes is of a temporary character, and that in the course of time the evil will to a great extent remedy itself.

We know that in all commercial relations the law of supply and demand governs the markets; so in the labour market when in any particular branch of industry there is a scarcity of labour, the inevitable result is that wages are raised to a figure commensurate with the demand. So also in regard to professions, such as school-teaching, law, or medicine; or in mercantile pursuits there are times when special inducements are held out to young men to enter these callings, and young men are quick to take advantage of these stages. The result is that there is soon an overplus instead of a scarcity of professional men, and the avidity with which these callings have been pursued is for a time quenched.

Again, we know that in all spheres of life that the selection or choice of a pursuit by any individual is largely dependent upon the earlier circumstances of his life. The majority of the youth of our country are engaged during the years of their minority in assisting their fathers at whatever occupation they may chance to be engaged in; this is especially true with regard to farmers, and when they come to enter the world on their own responsibility the great probabilities, as we have already intimated, are that they will choose the occupation of their fathers. Such, also, are the facts as a general rule. That there is sometimes a great deviation from this rule is due to two general causes; either there are disagreeable or repugnant features connected with the pursuit that is forsaken, or else there are greater pecuniary inducements held out in other directions.

Both these influences are at work among farmers' sons in Ontario, and are to a great extent accountable for the exodus that is going on.

There are many things connected with farm life that are uncongenial to their disposition, and there have been also many things to allure their attention to other pursuits.

Now, according to the principle we have laid down in a preceding paragraph, the time must come when there will no longer be good opportunities for farmers' sons to enter other trades and professions, which will be over-run, and they will be obliged to content themselves on the farm, even should nothing be done to make it more attractive. Choice will have to give way to the demands of necessity, and, therefore, as we have

already stated, the evil will in time largely regulate itself ; many who have deserted the farm will be compelled to retrace their steps, and a reaction will take place.

But would it not be a matter for serious regret if people should be forced by necessity to do that to which they are averse. If farmers are to be looked upon as the hewers of wood and drawers of water, and instead of being happy and contented to be always on the alert to spy some opening in the hedge of adversity, with which they are surrounded, through which they may count themselves fortunate to escape.

Moreover, we have pointed out that the exodus that is going on is in a sense temporary ; and we must remember that such a cure as time alone could effect must necessarily be temporary, too, and if no permanent remedy could be found, the country would be liable to recurrences of agricultural dearths, which would materially injure the national credit, because our agricultural products are our principal exports.

Our object therefore, will be to endeavour to show how farming can be made both a *pleasant and profitable* vocation ; and how the growth and development of this all-important industry may be made sure and steady, so that men, instead of avoiding it, will be led to embrace it. And he who devotes himself to farming has this great consolation, that he is compartively free from the rivalry and jealously which is common in other branches ; for though professional men and merchants may vie with each other, and though one's welfare may mean another's woe, not so with the farmer, for the prosperity of one cannot affect that of his neighbour to any perceptible degree ; making exception of course, for the commodities that depend upon local consumption, the price of farm products are quite independent of the quantity grown by any individual farmer, which is but a drop of water in the ocean of commerce.

We will now specify what, in our opinion, are the prominent and common causes in Ontario of the evil which we are discussing, and enumerate them as follows :—

(1) The speculative tendency of the age, coupled with a want of a more thorough and systematic class of farming, which will render it more lucrative, and thus counteract this outside influence.

(2) The laboriousness and hard toil attending farm life.

(3) The effects of education.

(4) A want of attractiveness and the social condition of farmers as a class.

(5) Inability of farmers' sons to obtain farms.

We will deal with them one by one in the order in which they are set out :—

With regard to the first named cause there is, without a doubt, a very prevalent disposition or desire among men in this age to accumulate wealth hurriedly ; not only the young, but men in middle life are seen abandoning the farm because it is too slow a way of making money ; they leave it to speculate in land, lumber, grain, or to enter mercantle life. Many of them, like the prodigal son, are anxious to receive their portion of inheritance, and when they do receive it, they plunge into some speculating scheme, expecting soon to realize a fortune, but alas ! for their hopes, how many are doomed to disappointment and financial ruin. It would be a difficult thing to suggest anything that would banish or destroy this evil tendency, nor do we believe, looking only at the interests of agriculture, that we would be serving the purposes of this essay if we attempted to do so. We read in mythology of the Sirens who sat on the shores of a certain island and sang so bewitchingly, as to allure the passing sailor, but only to meet with death, their attraction was irresistible. The Argonauts, we read, *only* succeeded in passing. The method pursued, was to provide better music in the singing of Orpheus, whose singing was so enchanting as to overcome the effect of the Sirens' music.

Now, we say, that a similar method must be used in dealing with this matter, it is an outside influence that cannot be removed, but may be overcome, and the only thing that can be done to remedy it, is to devise means of *making farming more lucrative.* If farming is a slow way of making money, what is the reason of it? To discover this, it will be necessary to examine the causes, and it will not therefore be out of our province to point out what are in our opinion some of the most palpable defects in the present system of farming as carried on in Ontario, and suggests improvements.

To commence with: We believe that too *much attention* has been given to *cereals*, we want more varieties. The great ambition of many farmers has been to raise tremendous

crops of wheat, because that article commands a good price generally, and the yield too compares favourably with that of other grains; they do not seem to care that the soil is impoverished by a continued strain upon it. The consequence of this is, that many farms are "run out," they want manure, and must have it before they can be made to yield as formerly; *more stock must be kept* on our farms, more attendance given to raising cattle. Special inducements are now held out in this department, this branch can be made to pay well now; a foreign market for Canadian beef has been established, and making allowances for slight fluctations, we believe a permanent one. While we are speaking about cattle, another thing suggests itself, namely, the character or breed of the cattle with which most of our farms are stocked. Making every allowance for the great improvement in this line, we do feel after all that the advancement has been slow.

It is surprising how many people still retain those miserable, dwarfish, scrubby cattle. Let every encouragement then be given to infuse "royal" blood into our cattle herds. We believe that many farmers are not fully alive to the importance of this matter. Our own personal observations have led us to this conclusion, and have led us to wonder whether Government aid should not be given to encourage the introduction of a better class of cattle, or rather the diffusion of that class of which many already are the proud possessors; would it, we ask, be any more out of place than setting prices on wolves heads (speaking of the past), or offering bonuses for tree-planting, not seeking to disparage such a worthy object. Again we would say to our farmers double your live stock, and let them be a superior quality.

Reverting again to the cultivation of the soil, there has been a great deal of looseness in this respect; our farmers want to learn, that by a proper and thorough cultivation of the soil they could produce as good results from one-half the land they are trying to till.

We have said that too much attention has been given to cereals, and we think that in these themselves, greater variety, a regular system of rotation of crops similar to English methods is needed. The method in England of pasturing land in turn, would, we think, be worthy of imitation in Canada.

Seed time and harvest are with many the only seasons of the year they deem of any importance. They would rather allow things to suffer neglect than pay for the services of a man, except in the busy time of harvest when they are forced, if they can secure help at all, to pay exorbitant wages. If they would consider, they would see that by engaging men permanently they would procure them at a more reasonable figure, and the difference they would have to disburse in the long run, would be more than made up by the attention that would be bestowed upon other departments of the farm. One thing this country is suffering from at present is an insufficiency of farm labourers. It seems to us that a feasible plan to remedy this, would be the importation of agricultural labourers from European countries which are overcrowded with people. It is true that they might not prove to be as useful at first as desired, being uninured to our methods; but they could be engaged at very moderate wages, and would soon become valuable servants. It would be a great blessing to them as well to be transplanted in Canadian soil; immigration agents should be zealous to carry out this project.

Another thing that requires attention is a more rigid enforcement of the laws to prevent the spread of Canada thistles. This may seem to be somewhat too practical but the fact cannot be hid, that they are becoming enormously prevalent; they are not only prodigiously destructive to the crops, but painfully so to the comfort of the individuals harvesting them. Summer-fallowing is the most effectual way of extirpating them, but it is very little use of one man doing this if his neighbour allows them to flourish; one person suffers through another's negligence, hence it is a case that requires the interference of the authorities. Strict compliance with the law in regard to this matter, which has been most grossly neglected, is of the most importance.

Another thing that would strike one very forcibly in visting a number of farms in almost any section of this Province, is the great lack of conveniences in the arrangements of the outbuildings and throughout the entire premises. There is also a manifest carelessness in the use of implements and general farm apparatus.

It has been well said "how great a part of life is made up of trifles," and though these defects may seem trifling, it can hardly be believed how much they affect the pros-

perity of the farmer, and what a wide influence they exert upon the youth, what is needed is *more system.* We have striking instances of merchants turning their attention to farming and being eminently successful; this is attributable, in a large measure, to the fact, that they have acquired systematic habits when in business, and that they exercised the same principles on the farm.

Now, some of these improvements we have suggested can be effected by Government agencies and agricultural societies, but, for the most part, it depends upon the farmers themselves, and it is really difficult to know how to bring about a radical change; but we believe, the most effectual method is to furnish them gratuitiously (if it can be done in no other way) with reading and information bearing on these subjects; let them know what can be accomplished by improved methods, let them have the benefit of every experiment; let pamphlets be compiled and published containing practical information, accompanied by figures and facts to prove the theories. Literature of this kind will have a good influence, it will quicken their interest and arouse their curiosity. This means has been found to be the most potent agency in other spheres, and why should it not prove so here.

Our touching on the matters we have been discussing may seem irrelevant, but after all, much of the trouble lies there; bad farming must have a great tendency to drive farmers' sons away from the occupation.

We will take up the next cause:—*The laboriousness and hard toil attending farm-life.* Farmers are looked upon by most outsiders as nothing less than slaves, and many of themselves believe that their's is the most toilsome occupation there is. The sons too share this feeling and are anxious to get into some sedentary business, or one that will require less physical labour. Machinery has done away with much of the hard work on the farm and will do more; we will not stop to comment on this, not because it is unimportant in the least degree, but because it is unnecessary; suffice it to say, that those engaged in this department have performed their part nobly. *Scarcity of farm labourers* is the cause of much of the complaint at present. We want in Canada a permanent class of farm labourers. How would English farmers succeed if labour was as dear there as it is in Canada? We have already touched upon this, but would just say again, that if we are to have that, farmers must stop making temporary engagements. One thing we notice, which is a conspicuous and common failing among farmers, namely, the *length of their working hours*, they have no regular hours; undoubtedly it is difficult and perhaps imprudent to adhere to any castiron rule as is done in cities and towns. There are seasons of the year when emergencies require special efforts, but it is a notable fact, that throughout the entire summer farmers make their hours extremely long as compared with men in other pursuits, when, instead of which they could achieve nearly as much in the end, by working reasonable hours, and would not impair their physical system.

This, we say again, is an egregious error which ought to be rectified, and remembering then that farmers are so largely dependant upon the assistance of their sons, is it any wonder that farmers' sons should contrast their position with that of mechanics and others who are afforded some opportunity for recretation? Is it to be wondered at that many of them become utterly disgusted with farm life? And if men do not wish to drive their sons away from the farm, they must give them *less work and more recreation.*

We now come to the third part of the subject:—

The effects of education.—Much progress has been made in education in Ontario during the last decade. Farmers' sons and daughters have flocked to our high schools and collegiate institutes, and it has been the history of all ages that any marked advancement of literature or science and art has not been unaccompanied by its effects upon the masses of the people. A feeling of unsettledness has been created among a large portion of the youth of our farming population. A fire of ambition and aspiration for higher intellectual attainments has been kindled. We can truthfully make the assertion without any undue disparagement that as a class farmers in Ontario are wanting in education. When farmers' sons have had opportunities, they have shown themselves able to cope with any other class. In our high schools and collegiate institutes they have not only held their own but surpassed others. But how few of those who have been given an education such as these institutes can afford, and—we speak now of those who have not had

any particular end in view when they entered these schools—how few of them, we say, who have proved themselves to be possessed of high intellectual capabilities, have returned to the farm. They enter pursuits simply because they can't satisfy the mental *crave* on the farm. What then is to be done, deprive them of education? We have actually heard some people suggest this plan. What we want is to have such a system of farming as will call into requisition the mental faculties as much as any other profession, so that the study of agriculture can be made the object of the highest ambitions, and one worthy of the attention of the very best talent that can be secured. If science has made such rapid strides in other branches, why of all pursuits should agriculture be behind. Many people have thought and still think that it is entirely unnecessary for farmers to possess anything more than the mere rudiments of education. What a mistake this is when we consider in how many instances a knowledge of different subjects is called into requisition. A farmer wants to be a chemist, a veterinary surgeon ; he wants to have a knowledge of geology, and to be acquainted with the principles of natural philosophy. We want educational institutions that will furnish suitable instruction for agriculturists. It must not be thought that a revolution can be brought about in a day, it will require long years of industrious effort to make our system of farming a more scientific one. The progress must be slow, but it may be sure. It is our duty to posterity to lay the foundation, the corner-stone has already been laid in the founding of the Ontario Agricultural College at Guelph, and other like institutions ; these are steps in the right direction. It will not be long indeed, we believe, before the benefits that will flow from them will be visible, but the ultimate good they can accomplish will not be felt till long after those at present conducting them have passed off the scene.

The fourth cause we have enumerated is :—*A want of attractiveness and the social conditions of farmers as a class.*

An inspection of farmers' dwellings and their surroundings will reveal the fact that there is a great lack of attractiveness about them, many possess nothing ornamental, and even nature is prohibited from doing her part. Some men are not satisfied unless in the front of their house they have a potato patch, and in the immediate rear a trough for feeding swine. There is a stimulant in cities and towns to adorn and beautify a residence that is wanting in the inhabitants of the rural districts. Without entering into detail, we say that it is a notorious fact that farmers, who are well able to beautify their places, have them in such a condition that it is simply disgraceful ; and if parents think that this does not exert an influence over their children, if they think that a home void of attractiveness will not have a tendency to exchange their fondness for the farm, then they must be destitute of every lofty impulse to which humanity is susceptible.

In the inner domestic circle too, a change is needed. Farmers do not do their children justice ; they are not treated as well as children of people who live in the cities and towns. They want to be supplied with a collection of *good books*, and also with means of healthful amusements. There is a great contrast between the homes of city and country people which ought not to be.

The last cause we have mentioned, namely :—"*Inability of farmers' sons to obtain farms*" is not a very general one, but there are undoubtedly instances where there are half-a-dozen sons or more on one farm, some of them must *exist*, and many young men in this situation are really desirous of farming, but have not the means to buy a farm and there is little inducement in Canada to rent one. They are not content to hire as farm labourers, and they enter business life, many emigrate to other parts where they can obtain land for a nominial figure. Now it is Ontario that we are chiefly concerned in, whether men farm or not when they leave Ontario is of no interest to us, they are lost to Ontario. Now with regard to this we would say that everything possible should be done to retain those young men in our own Province. There is a considerable area of valuable land still at the disposal of the Crown, and while endeavouring to induce immigrants to settle in this territory, we ought to do everything necessary to furnish our own youth with information respecting it. Anything that will keep one citizen from leaving us is worth more than that which will bring us two foreigners. Let every encouragement then be given to our young men to settle in those districts, rather than allow them to go

to other parts or enter other callings, on account of not being able to obtain farms in the older and more settled parts of the Province.

There is another cause which we have not mentioned, that is the disposition on the part of the *urban population to look down on the farmers*, they are denied a place in high society; this sort of thing is keenly felt by some, but it is becoming a thing of the past; farmers will be recognized as they should be. The farmer is the most necessary man, the merchants are the drones who live on the difference between the amounts received by the producer and paid by the consumer. Any feeling of disrespect for a farmer on account of his occupation should simply be ignored. There is, however, room for culture among farmers, this is largely due to a want of association, a farmer from the nature of his occupation is not thrown much into the company of others, his is to a great extent an isolated life; this would be greatly relieved if farmers would meet together often and discuss their business.

We think that too much stress cannot be laid on the importance of education. In countries where farmers are more educated than they are in Canada they hold a different position; and it must not be forgotten that any tendency that education might have to draw farmers' sons into other channels will be counteracted and regulated by laws that we have already enunciated. We contend that education expands a man's understanding and qualifies him better to cope with the difficulties of life in whatever position he is placed.

The attention of our educational authorities ought to be directed to the comparatively small attendance at our common schools in the rural districts. When education is more widely diffused among our farming population, they will be ready to make greater progress in agriculture, they will not be content to allow any hindrances of an obscure nature to obstruct their advancement, but will rise to that high standard of social and political relations which it is their privilege to enjoy.

THE INCREASING TENDENCY OF THE TIMES FOR FARMERS' SONS TO LEAVE THE OCCUPATION OF THEIR FATHERS FOR OTHER PURSUITS. ITS CAUSES AND REMEDIES.

By Fred. C. Wade, Toronto.

This Report was Highly Commended by the Judges.

No fact is more evident among farming communities in Ontario than the yearly increasing tendency among farmers' sons to leave the occupation of their fathers for other pursuits in life. The existence and growth of the tendency arrest one's attention more violently after the lapse of a decade or longer period, yet the increase is so rapid that it can be easily observed in a much shorter time; it commences to become evident as soon as a country begins to develop its commerce and manufactures, and grows as rapidly as the avenues for employment in those industries increase in number and variety. While our Province was young, and agriculture remained the exclusive employment of the great proportion of the population, farmers' sons remained at the plough handle, because as yet the circumstances of the country did not permit them to select any other occupation; they were given a Hobson's choice and had about as much power to choose other vocations in preference to agriculture as the cottiers of Ireland have had hitherto, of selecting one of the learned professions as their bread-winner. But the growth of the country was rapid, and population, as is always the case, gathered itself about localities possessing natural local advantages—such as good water connections with other centres of population; rich, fertile land, an abundance of clear-grained timber, within easy reach of carrying streams: or large and easily available supplies of minerals and metals useful in manufacture and for export. With the rise of towns and the elaboration of that practice of division of labour which always goes hand-in-hand with their

development, the avenues in which men might direct their energies were immensely multiplied. Of course it was plain that, under such circumstances, the ranks of the farmers' sons must be drawn upon for brain and sinew to support all other trades and professions to some extent. And this was, no doubt, beneficial within certain limits; every boy is not physically and mentally qualified for a farmer's life, merely because he has grown up upon a farm, and such a vast multiplication of other callings was sure to weed out many bad farmers who would subsequently direct their energies into channels of labour more congenial to themselves, and in which they could accomplish more for the welfare of the community.

Nothing could be better or more desirable. But the contribution of the sons of farmers to the occupations has not stopped at the natural limit. Not only those people who are strikingly unfit for a farming life have renounced it, but thousands who are peculiarly adapted for agricultural pursuits, and even others unsuited to anything but farming, have swarmed into the trades and professions, until, now, this custom of leaving the country for the towns is yearly becoming so much more marked that it is with no little anxiety that patriotic Canadians are seeking to bring all the causes of the tendency into full view, as the first requisite towards checking and destroying the evil.

Though the growth of commerce and manufactures had at first the effect of diverting many from farming, yet nothing is more evident than that this alone will not account for the great increase of the tendency to-day. On the contrary, but two causes can legitimately promote agriculture; and where unassisted commerce and manufactures flourish, there those causes are to be found most vigorously at work; where there is the greatest variety of manufactures, the best home market will always be found; while an extensive commerce benefits farmers, by relieving them of their surplus products. Commerce and manufactures, then, although they may in the first place injure agriculture, by enticing away many of her strongest sons, should in the sequel repair the damage, conducing as they do above everything to making it a prosperous pursuit. Though many boys leave their country homes to help the development of manufacture and commerce, that very development is what makes farming most prosperous, and should attract many into the paths of agriculture, adding, as it tends to do, financial success to the unrivalled charms of a wisely lived country life—not the life of a Virgil at a Tusculum, but that of an ordinarily reasonable man, in the midst of a good average number of physical comforts, and with leisure for the cultivation of his mind as well.

It is a remarkable fact, nevertheless, that almost any one of the trades and professions is coming to be preferred to agriculture. At the same time it is impossible to believe that farming, conducted suitably to the enlightenment of the times, would have fewer votaries than the best of the trades or professions. It is far from being an employment intrinsically distasteful or repelling. It is not necessary to draw highly-coloured pictures of farm life. Many wrong impressions must have been stamped upon the minds of those whose idea of a bucolic existence have been derived from the contemplation of quiet country scenes, such as those painted by Birkett Forster. A healthy idea of farming includes plenty of work; all classes have to labour, and especially the great producing class; it is a significant fact that from the time that our first parents were driven from the only spontaneous garden that ever existed, the stubborn soil had to be tilled by the "sweat of their brow." This, however, only puts farming on the same plane with every other kind of work, and does not prevent its being equal or superior to every other occupation as a business. No experience seems better suited for the development of the finest type of man. His—the farmer's—surroundings and everyday work are sure to make him physically "a good animal," and that, as Mr. Spencer says, is certainly the first and indispensable step towards becoming a good man; he can hardly help acquiring a sound physical constitution, and health is invariably the way to comfort and happiness. At the same time no one has better opportunities for the cultivation of his mind than the farmer has; during the long winter months, when seeders and harvesters have been stowed away, and there is little anxiety and less work, he commands more leisure than he could pleasantly endure without the aid of books and magazines. He has an immense field for study. The man whose business it is to deal directly with the great forces of nature and the productive powers of the soil can

always study to advantage. Gentlemen, in high reputation as educationists, hold that over-education is driving boys from the farm. Over-application may unfit many for physical exertion, but not over-education. It seems a narrow view to hold that a man could be over-educated for such an employment—a narrow view to take of farming. Nor is inordinate application necessary to the attainment of the best education. *Misdirected* education, however, is no doubt a great cause of the tendency, and with that it is that reformers have to deal. In the meantime, our position is that a farmer cannot be over-educated; from time immemorial the rustic has been the clown and the clod-hopper; and it is an outrage to hold that he must be kept in a state of mental nothingness in order that he may be retained in bondage on the farm. Education is always useful to the farmer, gives him pleasure, saves him labour, and lends dignity to his profession. Nor is there anything to hinder his becoming a man of fine tastes and culture. As Keats truly says, the country swain is conscious of "the form of beauty smiling at his heart" and his life in the fields and woods—"among the green things and the singing things of nature"—will not destroy his sense of beauty. On the whole, then, a farming life, in the best sense, provided that boys have received the proper training and education, ought to have great attractions for them.

And, yet, our farmers' sons are yearly dropping out of the ranks in greater numbers. Something is most radically wrong, and something must be done to retain them. The agricultural returns for Ontario for the month of May last, show that, of the 20,445,597 acres of land assessed in our counties, but 10,459,518 acres—or a little more than half—are cleared, while 7,880,661 acres remain in woodland, and 2,105,418 acres have yet to be reclaimed, being at present waste lands. But part of all the Province is cultivated up to any degree of perfection. Our agriculture, like that of all young countries, extends lightly over a vast area, and is more or less inferior; millions of acres have yet to be brought under cultivation, the whole Province can be better farmed, and thousands of acres, which have been killed out by over-cropping, can only be restored by better treatment in the future. Besides this, the complexion of the agriculture of the Province is about to change. We are upon the threshold of a new era in agriculture. With the opening up and settling of the vast prairie stretches extending in three plateaux from the western boundaries of Kewatin to the sheltered pastures at the base of the Rocky Mountains, immense areas, before untouched, will furnish such an abundance of grain for the markets of the world that our farmers, in self-defence, will be driven, ever more and more, to stock-raising, and concentrated systems of agriculture, demanding more farmers and increased attention. The salvation of our agriculture depends to a great extent upon our farmers' sons being retained upon the farm. They are, as a general rule, much better fitted by experience for the work than the most enthusiastic novice from the town could ever be; in fact, men educated upon the farm can never be adequately replaced by men who have not received that training. How are they to be retained? Owing to the alarm of the Romans, when, by constant wars, the people had lost their taste for agriculture, and a military and city life was preferred so uniformly that the fields were allowed to run wild and go to waste, Mæcenas is said to have implored Virgil to try to entice them back by writing a poem picturing the delights of a country life. The "Georgics" was of course written, but had not the desired effect at that time, nor is it likely that poems would be of much practical use now-a-days. Far different steps must be taken. All other things being equal, the charms of farming are not inferior to the attractions of any kind of life; boys are not driven from home by farming, but *by bad farming*. They leave home because the farm life is such as to create in them, sooner or later, a rooted distaste for it. They go, not because other occupations are a little better, but often because, for various reasons, farming has become unbearable. As long as farming is intrinsically a fine life, this should not be the case. Undoubtedly it *is* a way of spending life inferior to no other in usefulness, dignity, health, and happiness, but only, provided that it is rightly lived. But it is, in very many cases, wrongly lived, and continues to remain at the same level, while other employments are increasing in variety and attractiveness. No profession must be allowed to fall behind the times, and if farmers don't choose to catch the spirit of the age and act up to it, if farming is not enlightened and scientific, the superior

charms of enlightenment in everything else will attract the boys from their fathers' farms.

Great radical changes must be made in various directions, and firstly, in the treatment of our farmers' boys

AT HOME.

The best treatment will not, of course, make all boys, indiscriminately, farmers. Nevertheless, it will help to retain many boys at home who would be sure to be good farmers, if they did not rapidly acquire a distaste for farming and everything connected with it. Perhaps no boy feels the need of an attractive home more strongly than the farmer's son does. With city boys and town boys it is different. They can always have plenty of companions. There is hardly any limit to the entertainment they can derive from what they see and hear. A town boy can take part in many kinds of athletic amusements, become a member of societies of a social nature, in fact, as far as his means will permit him to do so, to that extent he can enjoy pleasures in an almost unending variety. In that way *his happiness* becomes *less dependent upon his home*. With the farmer's son, however, the pleasures of home are all-important. After the work is finished in the fields, he has only his home to go to; there he must find his pleasures, and if there are no comforts there, his life must inevitably become a dreary existence. It does not take long for the farmer's son to compare his own life with that of his friends in town, and if he finds his town cousins doing less work and yet enjoying life much more than himself, in spite of all the preaching as to the superiority of a farmer's life, in the long run he will leave the farm. The necessity, then, of examining his treatment at home, with the conviction that some of the causes of the tendency in question may be found there, is apparent. His home—so called—is what in far too many cases drives the farmer's boy away. Home influences are felt first, and it is only right that, in an essay like this, they should be first considered. The influences of the home circle are not the most powerful in determining a lad's career; in the case of farmers' sons, perhaps, more reform is required in education, but reform, like generosity, in this case can best begin at *home*, and afterwards radiate into education and the fields, and for this reason it may be first considered as regards the daily intercourse in the farmhouse and its objectionable features. Let us take a glimpse at the everyday life of many a farmer's son. A mistake which is often painfully apparent in farmhouses is the custom of *treating the boys as inferiors*. It is not an uncommon thing among farmers in Ontario to see great partiality shown to the girls in the house. This is carried to such an extreme in some cases that one would almost be led to believe that the sisters and brothers must be distinct classes of beings. If there is anything that farmers' boys should enjoy it is the advantage of all the society that is available in farm life; as a rule, their social side is very inadequately developed. Now, what is the status of farmers' sons socially? If "company" calls, the daughters of the house alone are seen. No one is expected to wish to see the boys. They, poor fellows, would be gawkish and ill-at-ease, and out of accord with the gorgeous patterns of the parlour carpet and the dresses of their sisters. *The parlour* of many a homestead, like the tomb of a saint, is opened only upon special occasions; and instead of being a place of ease and leisure after each day's work, where all the family may assemble and enjoy one another's society, it is during the greater part of the year a darkened room—because an influx of sunshine would fade the carpet. When it is opened it smells like a musty casket, and the boys are kept out of it almost with a flaming sword, lest their presence should defile it. This may at first sight seem a trivial objection, but a farmhouse is not a *home* till this sort of thing is done away with. A comfortable parlour is all-important in making a farmhouse attractive. Take, next, *the boys' room*. While his sister's room is often like a boudoir, anything, or next to nothing is considered sufficient for him. She may have a carpet woven in warm, cheerful colours, a handsome bedroom set, and other things that go to make a room inviting, but those who are "only the boys" are often furnished with nothing beyond the barest necessities; from the first they are regarded as young ruffians, and no attempt is made to improve their condition; associations of a pleasant kind will not cluster about a wash hand-basin and a bootjack, but they will connect

themselves with a neat, pleasant room. In fine, give a boy a room that he likes, his home immediately becomes pleasanter, and he is just so much more likely than he was before to stay upon the farm. Take next *his dress*. It is a long time since the ancient Britons considered themselves presentable in woad and the stains of berries. After every boy has reached a certain age, he begins to be more anxious about his personal appearance, and "every boy" includes farmers' sons. Nothing is more deserving of encouragement within certain limits than this very anxiety; it shows that the boy is beginning to respect himself, and a little encouragement at this point would in many cases make farmers' sons neat, cleanly, and careful in their habits for life. Carlyle, than whom no one was more averse to unnecessary dress, has said, "clothes have made men of us;" and there is a good deal of truth in the statement. But unfortunately for the farmers' sons—not all, by any means, but a good many—as soon as they begin to show unusual care about their appearance, their self-respect is interpreted as vanity, and they are often jeered out of it by others; they then fall back into careless, slovenly habits, losing, at the same time, the self-respect which they were just beginning to gain; with the loss of ever so little of his self-respect, he loses, at the same time, no inconsiderable amount of respect for his profession—farming. Let him, then, take a pride in himself and in his room, and, at the same time, the boy should be made to feel that every part of the homestead is home indeed.

There are two other most important reforms, which, if made, would add immensely to the comfort and attractions of many a farm home, as they would remove a great deal of the drudgery, which at present seems to be necessary with farmers and their families. One of these changes is already being rapidly brought about; and, that the Ontario Government and the Provincial Agricultural and Arts Association should have offered two prizes of one hundred dollars and fifty dollars, respectively, for the two best essays on "Creameries" is proof of the importance of that industry, in their eyes, to the farming communities of Ontario. To butter-making is to be traced a great deal of the worry and drudgery of farmers' wives. Before cheese factories became general, cheese-making was to blame for a great deal of labour on the part of farmers' wives, of which they have since been relieved. There is not the shadow of a reason why butter should not be made on the "creamery" system, any more than there is that cheese should not be made on the factory system. Indeed, the dictates of common-sense are all the other way, and the wide adoption of the creamery system throughout the United States has demonstrated its success. It stands to reason, in butter-making, as well as in every other process, that manufacturing on a large scale—on a scale sufficiently great to allow of the most complete division of labour—is by far the cheapest; indeed, the verdict of those who have adopted the plan of sending their milk to creameries, as grist used to be sent to the mill, is that they have saved time enough to restore, over and over, any money they might lose through not selling the manufactured article, while, at the same time, rest has been secured for their wives, and the comfort of their homes has been most materially added to. The agricultural returns to the Ontario Bureau of Industries, show that sixteen of these creameries were in operation throughout the Province during the season of 1882; they are, without exception, a pronounced success; they secure uniformity and excellency in the quality of table and tub butter; they accomplish its manufacture in the least expensive way; and finally, they relieve that notoriously over-worked class, farmers' wives, of a great and oppressive load of unnecessary toil, giving them a chance to be cheerful, and make their homes cheerful for their husbands and their families. Such a reform would accomplish its quotum towards making farm life agreeable, and retaining farmers' sons upon the farm.

Still another reform, which would greatly better the nature of life upon the farm, remains to be alluded to. Like all the foregoing changes submitted as advisable, this, too, has to do immediately with *home* and its influences. It is customary among a great proportion of our farmers to hire men by the week or month in busy seasons, boarding them at the homestead. These men, as a rule, dine at the same table with the farmers' family, sharing exactly the same fare as long as they remain in their employment. Of course, there is nothing objectionable in this in itself. The spirit that welcomes them to the same board is exactly right, as it is broad and humanitarious in its nature. That,

of course, is not what any sensible person would object to. But the custom is undoubtedly harmful, and has a great deal to do with making the farm life distasteful. In the first place, it destroys the privacy of the home; in the second place, it gives the farmer's wife and family mountains of work, altogether unremunerative and thankless; and, thirdly, by converting the farmhouse into a boarding-house during a great part of the year, it takes away the home element—its greatest attraction—and the removal of which cannot but help to strengthen the tendency among farmers' sons to forsake the old homestead. The practice is a necessary incident to the custom of engaging men to work by the month, or for shorter periods. In some cases this is necessary, but often there is not the slightest reason for it, and it certainly ought to be given up wherever that is possible. Any man, who has one hundred and fifty acres in good working order, needs permanent help in managing his estate, and should engage his men by the year. The system of hiring families, and locating them in tastefully-built cottages on the farm, has many advantages, and is certainly the surest way to retain labour. Men hired by the year can be secured at less salary; they feel much more interest in the work in hand than a temporary helper ever does, and when extra hands are needed they can be engaged without board, obtaining it at the man's cottage, instead of at the farm-house. The following correspondence is taken from the May report of the Ontario Bureau of Industries:—Writing from Zorra township, Oxford county, one correspondent says: "The only way that farmers can secure sufficient labour is to build comfortable cottages on their farms, with a piece of land attached, and employ their men by the year." The other, writing from Ekfrid township, in Middlesex, says: "I consider that one of the greatest drawbacks and hindrances to good husbandry in Ontario is the scarcity of labour and the consequent high price. But may not the man who suffers most (the farmer) be somewhat to blame in the case? We hire single men for a few months only, who feel no interest in our business, have to be paid in cash, and leave when the contract has expired. This also adds a heap of work on our wives and the whole household, overworked before. If this labour was performed as in the Old Country, by a married man, all this would be changed. Every man owning and cultivating, say, one hundred and fifty acres, should build a cottage for such a family, for the house must be built before the occupants can be received."

So much for the causes tending to make a farm boy's home unattractive, and so much for the remedies. A boy should never be treated as a pack-horse, but should be regarded as a good citizen in the rudimentary stages at least. All the light that society, kind treatment, and attentions that he can appreciate are capable of allowing to flow in upon his life, should be allowed him ungrudgingly. He should be kept wide awake, and not allowed to grow dull like the clods. A great deal is to be expected from the home influences with which farmers' sons are surrounded. These are certainly not beyond improvement, and the writer is convinced that what has been said on this head is not valueless, but contains suggestions which, if followed out, would effect much towards making farm life more attractive and retaining farmers' sons upon the farm.

But much as home influences may be instrumental in driving boys away from, or retaining them upon, the farm, there is no doubt but that our present system of education is to blame in a great measure for the increasing tendency among farmers' sons to relinquish the occupations of their fathers for other pursuits.

EDUCATION.

If the causes of the tendency lie mostly in the system of education, when once they are detected, the remedies can be applied at once, and uniformly. Faults at the homestead cannot be corrected by public interference, as each private family must effect its own reforms, but a flaw in our educational system can be remedied without delay, not only here and there, but in every school-house, in every farming community and township in the Province. There is hardly any limit, then, to the extent to which an educational reform may become widespread, when once we have ascertained what changes are required. It is a well-known fact that an immense proportion of our farmers' sons become school teachers. Our educational system is such that, by working in the sum-

mer in the fields, and during the winter at the Public, High and Model Schools, they can become advanced by easy gradients from third-class to second and first-class positions as teachers. No doubt immense numbers of them enter other professions, such as law, medicine, and theology; but it is quite manifest that teaching is the almost invariable stepping-stone, and the stepping-off point for many from the farm to the town. It is absurd to say that these men are required in the professions. No doubt there are many good men amongst them, but a really good man is required just as much upon a farm as anywhere else; others could take their places in the professions, but they themselves could not be replaced upon the farm. This tendency among farmers' sons to enter the professions is a remarkable proof of the power which lies in education of arranging the destinies of great numbers of people, and as education leads so many from the farm, there is not the slightest doubt that a change in the system is all that is necessary to lead them back again. Without some change in the education of farmers' sons, all that home influences might do towards retaining them upon the farm, is sure to be undone; on the other hand, an education bearing strongly upon his work may so interest a boy in his occupation that a great deal would be required to cause him to forsake it. Agesilaus, King of Sparta (pardon the reference to so ancient a person), when asked what was the best education for a woman, replied, "that which will prepare her for what she has to do through life." Centuries have passed since this practical advice was given, and yet to-day people seem to be but half awake to the fact that a practical education is the best. Scholastic branches which have hitherto been regarded as possessing superior powers of an educating kind are losing their popularity, and people are commencing to see that every-day studies in science—natural science—and the practices of farming, for instance, store the mind with more useful facts, train the memory as well, and sharpen our perception of cause and effect as much, or more, than any amount of delving in pleasing and cultured, but not equally useful studies. No one would say that the study of the ancient classics, and other such studies, are of little use, but surely all will agree with a great modern educationist, that they partake of the nature of top-dressing, and that a popular system of education must be first and foremost, *practical*. Now, our educational system in Ontario, to be practical, must contain a course in farming. Teach boys theoretical farming at school, and their parents at home will give them the benefit of their practical experience; fathers and sons can render one another reciprocal benefit in this way, and their common ground will create between them a bond of sympathy instead of the bar of disunion which at present arises in no small part from the diversity of their attainments. The "old folks" would no longer be unsophisticated, but their sons would respect their opinions, and there would be little room for the growth of that false pride which makes many farmers' sons think that their homes are not good enough for them.

The fact is that education at present is a great power in directing boys away from their fathers' farm. The effect which study has in making a pursuit interesting to a man is very great. Let it but be carried to excess, and the pursuit becomes a hobby and the man a slave to it. The pleasures of study are deep and great, and associate themselves with the subjects studied. It becomes all important then that a man should study most what is to be his life's work. As the lawyer becomes more deeply interested in law the more he studies it, and in the same way the engineer with engineering, and the doctor with his profession, so the farmer, to be a single-hearted farmer, must study farming. There are two pleasures in study, the momentary pleasure of conquest in mastering a subject, and the subsequent sense of power, with, of course, other intellectual pleasures accompanying the perception of cause and effect. Now, there is no reason in the world why these pleasures should not be allowed to associate themselves with the study of natural sciences and farming rather than with languages and the more advanced portions of Euclid, algebra, etc. Speaking of the benefits which biology, or the science of life, has conferred upon farming, which must necessarily conform itself to the laws of vegetable and animal life, Mr. Herbert Spencer, in his pamphlet on "Education," instances the following:—"The truth that the production of animal heat implies waste of substance, and that, therefore, preventing loss of heat prevents the need for extra food—a purely theoretical conclusion—now guides the fattening of cattle; it is

found that by keeping cattle warm fodder is saved. Similarly with respect to variety of food. The experiments of physiologists have shown that not only is change of diet beneficial, but that digestion is facilitated by a mixture of ingredients in each meal, both which truths are now influencing cattle-feeding. The discovery that a disorder known as 'the staggers,' of which many thousands of sheep have died annually, is caused by an entozoon which presses on the brain, and that if the creature is extracted through the softened place in the skull which marks its position, the sheep usually recovers, is another debt which agriculture own to biology."

And much as chemistry, biology and the other sciences have done towards developing agriculture in the higher paths of research and discovery, much more remains to be done in teaching the results of these researches. An intellectual and scientific interest must be imparted to the work. Mr. Ruskin says that the only true workman is he whose mind works with his chisel; as the true sculptor must be a designer, so the true farmer must be an intellectual farmer. Educate a farmer's son, as King Agisilaus says, with "a view to his future employment." Once we have a race of educated farmers, and the dignity of the profession is established, and this in itself will be a great incentive to many to become farmers. At the same time the profession will become modernized, and life upon the farm less hum-drum; this will do much towards retaining the more restless spirits whose appetite for "life" leads them away to the towns. Some poet has said:—

> "Life's dark cottage, battered and decayed,
> Lets in new light through chinks that time has made."

But there is a race of farmers who seem to become, nevertheless, less receptive of light the older they become. Their farms are often at least a generation behind the times, and nothing will lead them to adopt modern improvements; this is absurd, for the age is first, and farming must catch up to it to be popular.

But it is little use talking of *a change in education which will remedy all these things*, unless some definite idea of the change required can be advanced. Fortunately, a scheme has already been proposed which would seem to meet the requirements exactly. The scheme to which allusion is made will be found in the Report of the Council of the Agricultural and Arts Association of Ontario for the year 1881, and was adopted in 1882 (pages 547). It is a part of our educational system to hold annual examinations, called the Intermediate, Third Class, and Second Class Examinations respectively. The two latter examinations are tests for the granting of non-professional certificates to young men and women, by aid of which, and after spending the prescribed term at a Model or Normal School, they are equipped as teachers. Now this is the point where there is the greatest exodus of farmers' sons from the farm, and the scheme above alluded to seems to be just what is wanted not only to retain them, but to create an unparalled interest in farming. It is proposed to hold, side by side with the graduation course in teaching, a similar course in agriculture, making use of exactly the same machinery for examination, returning results, etc., which is used in connection with those other examinations. The Minister of Education has signified his willingness to assist the Association, and the Committee appointed by the Association to report upon the scheme, has recommended that the first examination be held towards the end of June or early in July, 1884, and that $210 be appropriated annually, to be spent by the Association in giving prizes.

A course of reading has also been prescribed for third and second class certificates. The questions to be presented to Third Class candidates will be such as could be answered from a knowledge of the first principles of agriculture, "such," the report says, "as can be learned from a general course of reading on the subject, or from elementary lectures, without special study of the natural sciences. In the Second Class Examination," the report continues, "a broader and more exact knowledge will be required, and the questions will be of such a character as to test the general attainments of the candidate, and at the same time enable him to give proof of excellence in those branches of the subject to which he may have devoted his special attention."

The popularity of such a course is assured. It is unnecessary, even for the sake of definiteness, to quote the syllabus incorporated in the report. It has been published in

various forms, and is familiar to all farmers. Even a cursory consideration of it is sufficient to convince every farmer that it is sure to do incalculable good to agriculture.

In future, if this scheme is put into practical working, farmers' sons while working through the summer upon the farm, can prepare themselves during the long winter months for graduation in the great producing profession. They will soon find that farming supports and requires the dignity of intellect as well as any other profession does. It will stand inferior to no other pursuit in life as fostering that peculiar compound of physical, intellectual and other qualities that go to make up the best type of man before referred to.

In the meantime there is no reason why the Agricultural College should have less to do. We look upon it in Ontario as the seat of experiment and research in farming and stock-raising. For those who can spare the time away from home it will always offer superior educational and training advantages of a practical nature, which can be obtained in no other way, and there is no doubt it has a great future before it.

The preponderance of muscle and some absence of thought in the farming operations of the past have had much to do in partially ruining our Province as an agricultural country. All the energy and knowledge of her farmers for the next hundred years will be required to restore the good part of the old state of things. What havoc would a little knowledge of forestry and the value of timber growths have prevented, had the country been controlled in accordance therewith. The great forests have been cut away indiscriminately; in many cases the only reward being a rocky or sandy surface of thousands of acres. Great sand ridges have been laid bare, useless for no other purpose but the growth of wood; forests, square miles of fleckless and flawless timber have been burned away through carelessness or folly, and all the soil that supported them has been charred by the same flames. By the burning and destruction of our forests, the regulating influences that foliage exerts on climate have been lost, and in many places the rains no longer come "in due season" as they once did. It is to be hoped that the farmers of the future will be educated in forestry, as, then, we may look for a return of the old state of things—for the growth of new patches of forest at intervals all over the country to break the force of the winds, attract the summer showers, and furnish wood for the many purposes for which it is valuable.

Farmers have much to expect from meteorology, or that branch of science which treats of the weather; in fact, the sciences have so much that is useful to tell farmers, that the men who are best able to take advantage of what they say in regard to breeding, machinery, soils and weather, are the men who alone can be the successful farmers. Meteorological reports, through the instrumentality of perfected appliances, and the wider spread of weather observations, are year by year becoming much more valuable, and fore-handed. Statistics, too, such as those furnished by the Bureau of Industries, will become a profitable subject of studies for farmers, giving them, at a glance, the state of the crops throughout the Province, and pointing out to their common sense where to sell and where to buy, and when to do so. Farming must soon be carried on by the aid of a farm literature, and by the exercise of the greatest intelligence, as well as any other of the professions. To become a sterling, good farmer, will soon be an ambition to boast of; it will, at the same time, be a task attended with the greatest amount of pleasurable and profitable interest. It will no longer be a life of uninterrupted drudgery, as some people make it at present, for intelligence and drudgery do not go together. Perhaps, then, we shall see some of those anomalies done away with —such as men stooped and decrepid, slaving away on their farms till old age comes upon them, and they give up in despair, after selling the old homestead, because none of the boys care to take up the work where it has been left off.

There remain some other suggestions which cannot conveniently be classed under either of the above headings, but which are, nevertheless, of great importance. Home training and education are all very well as far as they go, but a time is sure to come when farmers' sons *wish to have farms of their own*. The difficulty, and often the impossibility of accomplishing this, is another cause which drives many despairing boys away from the farm. This is worthy of every farmer's consideration. The condition of things has no doubt greatly improved in this respect during the last generation, but

there are yet not a few farmers who work their sons to the limit of endurance during the early part of their lives, until they arrive at a time when they begin to look after their own welfare, only to find that they have nothing to face life with after many years of hard work. Unless a farmer is able to make provision for his son by furnishing him with a farm when he becomes of age, he should pay him in some regular way, and encourage him to save his earnings and invest them in a good piece of land. If the boy has no land, and no money to buy it with, he will, in most cases, leave the farm from sheer necessity, becoming a sewing-machine agent, or book agent, and often something much worse. The number of men who leave in this way is perhaps not so great as it was some years ago, but it is certainly great enough to-day to make it a subject of serious consideration with every farmer.

One of Horace Greely's twelve admonitions to farmers was, "never go in debt." Young men who have not been set well on their feet financially are only too likely to rush into debt and secure a mortgage at their first entrance on life. The extent to which farm mortgages have multiplied during the last decade is astonishing. The mortgage does not look like a great encumbrance at first—it even looks inviting—but there is an inside to every false face, and there are such things as whited sepulchres. A life struggle against debt is one of these. The facility with which debts are incurred is at the root of a great deal of distress among farming communities. Farmers should give their sons the help of their advice in these matters, not forgetting to reward them amply for their former work at the old homestead.

Many improvements of a minor nature might still be suggested, but the writer trusts that the salient points of the mistakes which are commonly made have been brought carefully and fully under review. He is convinced that if the precautions which have been advised were fully attended to, much would be done to check that tendency, yearly on the increase among farmers' sons, namely, the practice of forsaking the occupations of their fathers for other pursuits. The boy has been watched in his home life, and at school, and substantial reasons have been found why his farm life should become distasteful; at the same time remedies have been suggested which seem to meet the requirements in each case. A little more space might be taken up with advocating the establishment of societies of various kinds of a social and entertaining nature, in each neighbourhood, but it is a question whether this would be as great a success now as it would some years hence, when farmers' sons will be better educated; at any rate they will come as an outgrowth incidental to a better state of things intellectually.

ESSAY ON THE BEST AND MOST PRACTICAL MEANS OF IMPROVING THE QUALITY OF BUTTER IN ONTARIO; BOTH AS REGARDS ITS MANUFACTURE IN PRIVATE DAIRIES AND IN CREAMERIES.

By David Nicol, Cataraqui.—First Prize.

Awarded by the Ontario Government.

It is impossible to obtain anything like a correct estimate of the quantity of butter made in Ontario. Statistics bearing on all agricultural products are very incomplete; but more so on butter than on any other. There are in the Province about 680,000 milch cows, and although they may not all be considered as first-class dairy cows, capable of each producing annually 300 lbs. of butter, I think 200 lbs. for each cow would not be an extravagant calculation, so that if their product was all manufactured into butter it would aggregate 136,000,000 lbs., which, if worth twenty cents per pound, would amount to $27,000,000. But latterly by far the greater part of the milk has been manufactured into cheese, generally of a quality which brings the highest market price. While with Canadian butter, on account of its indifferent character, in foreign markets the price has been almost at a minimum. Therefore the manufacture of cheese of good quality at high price, has proved more profitable than the manufacture of an inferior quality of butter at a low price.

When in conversation a short time ago with A. A. Ayer, Esq., of Montreal, a gentleman with the highest reputation for integrity, and who is said to be the most extensive butter dealer in Canada, handling over 2,000 tubs weekly, a large portion of which is purchased in Ontario, he stated to me that only about ten per cent. was really good, and that more than ten per cent. of it was decidedly bad, with all grades between first-class and very bad. He was selling butter by the tub as high as thirty cents and as low as fifteen cents per pound. He calculates that if all the poor butter which he alone handles could be made of a superior quality, there would be an annual gain to the dairymen of the country of not less than $250,000, and we have no reason to suppose that others engaged in the business could give a more favourable report. There are about 50,000,000 pounds of butter exported annually, which, being poor, is worth ten cents per pound less than of superior quality, this causes an annual money loss of $5,000,000 which falls directly upon the dairymen of the country. It is, doubtless, a knowledge of such facts that has led the Government as well as the Agricultural and Arts Association to adopt active measures with a view to the very much needed improvement in this important branch of agricultural industry.

The manufacture of cheese has, in a great measure, been revolutionized within the last ten years by the adoption of scientific methods, and with the help of improved mechanical apparatus and a better system of marketing. The use of the same means will help to bring about a reform in butter-making, and it will come about the more readily when it is found to be the more profitable of the two manufactures, as is the case at present prices of first-rate produce.

I learn from the best authority that to make one pound of cheese nine to thirteen pounds of milk, and one pound of butter eighteen to twenty-six pounds of milk, is required; so that cheese at ten cents and butter at twenty cents per pound would bring about the same cash receipts with this difference, that the butter-maker has the skim-milk for the raising of calves, which is a very important consideration; and also that the production of butter is not so exhaustive of the land. But while ten to twelve cents is the highest price for the best quality of cheese, a first-rate article of butter readily commands thirty to forty cents per pound. So that if the cow which annually produces 400 pounds of cheese at ten cents can be made to produce in the same time 200 pounds of butter at thirty cents per pound, the advantage in cash receipts is thirty-three and one third per cent; twenty dollars per cow.

If a larger number of dairymen were to engage in butter instead of cheese-making, the scale would probably turn and cheese become higher and butter of lower price. The great complaint is not that our dairies do not make enough butter to supply the demand but that so great an amount of money is lost to the trade on account of the large quantity of poor butter which burdens the market. Doubtless the time will soon come when the two industries will be regulated according to facilities and advantages, so that the profits with other considerations will be equalized. Some farms are better adapted for the one purpose than for the other.

Cows pastured on upland or hilly farms, with calcareous lands abounding with rich natural grasses and white clover, and with pure spring water, furnishes milk which produces the best quality of long-keeping butter; whereas low flat clayey lands, where the growth of the natural grasses is much more luxuriant, furnish abundance of milk which produces a fair quality of cheese, but from which it is impossible to obtain a first-class article of butter. And from cows pastured in low, wet localities, where coarse swamp grasses prevail, where the water, stagnant, putrid and foul, is full of organic life, neither good cheese or butter can be obtained. Purity of food is one of the first essentials in the production of a prime article. The want of attention to this particular accounts, in some degree, for large quantities of inferior butter. This is one of the difficulties to be met with in creameries, where the makers are expected to accept the different qualities of milk on the same conditions.

It is said that the great bulk of poor butter comes from farm dairies. This is not necessarily the case, and it should not be so, for although creameries may have some advantages over the farm dairy, the farm dairy has this advantage over the creamery: That the milk, from the time it is drawn from the cow until the butter is obtained, is

under the immediate control of the manufacturer, and also that its condition is not affected by transportation of long distance in unfavourable weather.

Gilt-edged butter can be, and is in many instances, produced in farm dairies, and where poor butter is the rule there must certainly be defective management, and in most cases this arises from a lack of knowledge of the proper process of manufacture and the want of the needful appliances.

It is hardly to be expected that the creamery or factory system will ever be the means of accomplishing quite as much for the butter as it has done for the cheese industry. Factories of either butter or cheese can only be worked six or seven months of the year, so the farmer, in order to get the full benefit of his cows throughout the season, must have his home dairy for the making of butter before the factory opens and after it closes.

The transportation of milk to the cheese-factory does not seem to injuriously affect it for that purpose, but for butter-making the contrary is the case.

The "cream gathering plan," in which only the cream is taken to the factory, would seem to, in a measure obviate this difficulty. But one pail of tainted cream affects the whole mass, and it is almost impossible to have a large number of contributors in which there are not some who have erred in the manipulation or neglected the requisite cleanliness.

Creameries can only be successful when the perfect purity of every single contribution of cream is fully assured. So it is quite probable that, for some time to come, private dairies will require special attention.

Co-operative butter factories are not without advantages when properly managed. There is a great saving of labour to the farmer and his family.

There are farmers to whom the needful facilities for home dairying are inconvenient. There is sometimes scarcity of pure and cold water, and much trouble in procuring ice, difficulty in procuring hired help when needed. To the small farmer the creameries are a decided advantage, because the labour is proportionately more with a small number of cows than with a number which gives constant employment to one or more hands; and there are many localities in which they could hardly fail to be a general benefit. It is claimed for the centrifugal apparatus that, besides thoroughly skimming the milk, it frees it from impurities. So to creameries conducted on this system the purity of the milk when delivered is not of so much importance, thus removing one of the principal objections. But this does not do away with the fact that, if a great reform is to be brought about in this branch of industry, the watchword must ever be

Cleanliness.

There are some points in the process of manufacturing butter which admit of diversity of opinion, hence I will add to my own experience extracts from the various opinions of professional dairymen. Circumstances sometimes necessitate different treatment under the same method. But there is one point on which all who have succeeded in making good long-keeping butter are agreed, and that is that absolute cleanliness is of the utmost importance. Natural facilities combined with proper effort are generally followed with success. Energy and determination will often overcome natural obstacles, but when slovenly habits and ignorance combine with natural disadvantages, poor butter always results.

Without perfect cleanliness in everything pertaining to the business, it is impossible to make butter that will keep in good condition. The cow-house must be kept clean and thorougly ventilated, so that no foul odours shall be absorbed by the milk, and that the animals may be kept in healthy condition in order to give pure and wholesome milk, the udders must be cleaned before milking, so that no filth may drop into the pail; the hands when milking must be clean and dry, the practice of wetting the fingers with the milk is abominable, and must not be allowed, because it is impossible to use it without defiling the milk. The milking-pails, which should be of tinned iron, the milk pans, cream pails and churns must all be thoroughly scalded and cleaned from every particle of impurity, so that no taint may be communicated to the milk or cream. The milk-room must be

kept perfectly clean and free from all impure odours. All utensils used in connection with the dairy, after being thoroughly scalded, should be rinsed with pure spring water, and then exposed to the sun for a time, that they may be purified.

Cream Raising.

There is no part of the process of butter-making about which there has been so much controversy; and, on reading the various articles contributed to the leading agricultural journals by practical dairymen, giving the result of their experience and the deductions therefrom, I find so much diversity of opinion, that I am forced to conclude that some of the experimental tests are wanting in accuracy.

According to practical analysis, the constitutents of cows' milk are as follows: subject however, to slight variations, depending upon the food and condition of the animal. The estimates is upon the basis of 100 parts.

Water.	Butter,	Sugar and Salts.	Casins and ins. Salts.
87·4	4·0	5·0	3·6

Milk then, as a whole, is a compound solution, and for the purpose of separating the oily part or cream from the residue, there has been obtained in the United States and Canada within less than a quarter of a century, patents for about fifty different inventions, with a view of obtaining, from a given quantity of milk, at the least cost of labour and time, the largest amount of cream in the best possible condition, and very generally it is claimed by each inventor that his apparatus will accomplish the most, giving the best results in every respect. Many of the inventions, however are only variations of some applied method, without attraction of principle; and although each of them may have something worthy of recommendation, and many of them are well adapted to the purpose, I fail to see that anyone of them could be considered the best under all circumstances.

The cream of milk exists in small fatty globules invested in a thin membrane of caseous matter. These fatty globules vary in size from 1,2000th to 1,4000th part of an inch, and again they vary in size in milk of different animals of the same bred. The accompanying illustration (Fig. 1) gives the ordinary appearance of healthy milk when examined by a highly magnifying power. In proportion as milk is rich in butter, so are the fat globules present in increased size and numbers.

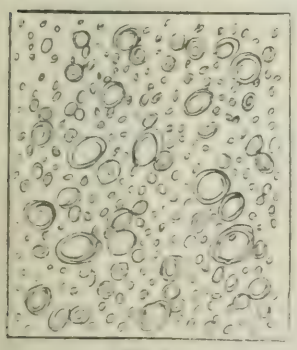


Fig 1.

In the process of cream rising these fat globules go to the surface, because oil is lighter than water. The largest globules are the lightest, and consequently rise to the surface first, they contain the greatest amount of liquid fats, butyrin and olein and consequently churn the most readily, and make the richest and most highly flavoured butter, as is proved by the high colour and flavour of the butter churned from the first skimming of ordinary milk. The fact finds still further proof in the fact that such butter has a more oily appearance and will not retain its high character long after being made.

The small fat globules have a greater specific gravity because of being more largely composed of stearin, a fat common to tallow, suet and lard. Stearin is one of the solid fats and therefore more dense. That the small fat globules contain more of this fat and less butyrin (a fat peculiar to butter) finds proof in their greater specific gravity, and of the butter being made from them being pale, deficient in flavour and insipid, and keeping better than the gilt-edged butter made from the large fat globules.

The difference in the specific gravity of cream and skimmed milk is but little, not more than two per cent. at a temperature of 98° F. We can increase the difference by taking advantage of the fact of water being a better conductor of heat than oil, and of oil

expanding more than water by heat. Cream rising is aided more by increasing the natural temperature of the milk than by lowering it, because the fat globules expand on being heated in greater proportion than the particles of water. In a falling temperature the water cools faster than the fat globules, and thus in either a falling or a rising temperature we increase the difference between the specific gravity of cream and milk. Although an artificially heated temperature is most conducive to cream rising because of the greater expansion of the fat globules from heat, it being impractical on a large scale, we are forced to take the other course, that of cooling the milk, because in a falling temperate water cools faster than oil, and thus favours the cream rising process. In a very low temperature the quantity set in a vessel, must be greater in order to keep the varying sufficiently long to give time for the cream to rise. Consequently it is necessary to set shallow at a high, and deep at a low, temperature.

To many minds the long continued discussion of deep and shallow setting has been delusive, because of the conflicting accounts of the results obtained from the different methods. Some inventors attach much importance to ventilation, while others contend that it is quite unnecessary. Some of the contrivances are quite simple, others are complex and require quite a knowledge of the laws of heat and cold in order to *fully* comprehend and control their workings.

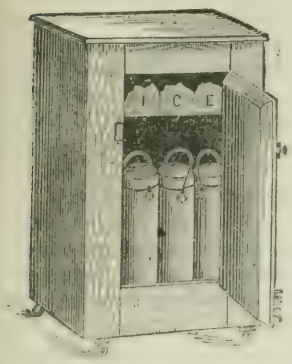
Limited space prevents a full discussion of all the different phases of the various apparatus. So only a brief description of a few of the most important can be given. That choice butter is made from cream raised in the common shallow pans, will hardly be gainsayed, for it is continually being verified in thousands of instances. But on account of the difficulty in maintaining an equable temperature throughout the season, there will and does occur frequent misgivings, especially in extreme hot or cold weather. When milk is set in shallow pans in a moderate temperature the cream rises, but slowly, hence we are compelled to let it stand twenty-four to thirty-six hours, in favourable climates with favourable surroundings, the butter made by this process is not impaired in quality by the necessarily long exposure. But the fact that only under specially favourable circumstances is such the case, gave rise to the inquiry after some mode of accomplishing more positive results. And now from years of experience in many of the best creameries in the United States and Canada, as well as by many of the most practical private dairymen who have practised the deep-setting system, it has been satisfactorily proved that so far from exposure being necessary or desirable, it is absolutely injurious unless the conditions are quite favourable.

All the different methods of deep-setting are based upon the same principle; that of cooling the milk rapidly, and although it is doubtful whether by the deep-setting, rapid-cooling process a larger amount of butter can be secured from a given quantity of milk, than from the same milk set in shallow pans under favourable conditions; it is certain that taken one month with another throughout the year in this changeable climate, a large per cent. of cream and butter can be obtained; and also that the milk being kept at a uniform temperature by the use of cold water or ice, the butter product is more uniform in quality than that made from the open-setting method, with the milk exposed to the fluctuations of hot and cold air.

The large-pan system with its cooling attachments has not long remained in favour; because, although it has the merit of saving labour, there is still the exposure of the milk to atmospheric influences; and the milk by this method being made colder than the surrounding air, it the more readily absorbs any foul odours or gases which may be in the air.

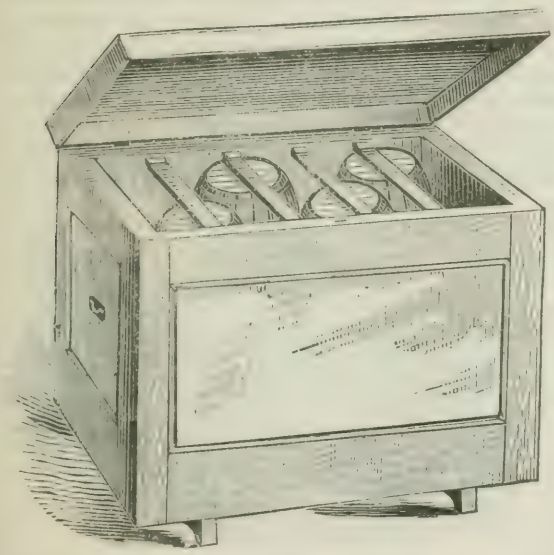
It is well known to most people that either water or milk which is colder than the air in the room in which it is exposed, will absorb a large amount of whatever impurities there may be in the air, and the colder the milk or water the greater is the absortion; and that is the reason that butter made from cream raised by this method is often of inferior quality. And the fact that many sets of these pans, which were in use but a short time are now for sale, at but a trifle of what they cost, leads me to the conclusion that they were utterly impracticable.

I am not certain to whom is due the credit of introducing the deep-setting system into this country, but I think it was L. L. Hardin, of the United States. In his method



the cans are set in a box or cabinet with doors in front like a cupboard, as in the accompanying diagram. It has a shelf or rack on top, on which the ice is placed over the milk, and a shallow pan or sink at the bottom, in which the cans are set, and which holds the water, dripping from the melted ice. Although the water from the melting ice falls upon and around the cans, the main reliance for cooling is upon the cold air confined in the cabinet. This system saves a large amount of labour, occupies but little space, and gives an even quality of butter throughout the year. Outside temperature is of no account, except in utilizing ice. Outside odours have no influence on the milk or cream, there is no exposure to flies or dust; the natural aroma of the butter is maintained, the original colour is preserved unchanged; the milk is less exposed to accidents, and the skimmed milk is kept sweet for calves or swine, or for market. Nothing about it is sour, consequently all is easily cleaned.

Next came the Swedish system of submerging airtight deep cans in cold water. This system was introduced in the eastern States by Mr. Cooley, hence it is called the "Cooley System," and now there are numerous immitations and improvements extensively used throughout the country. The accompanying drawing from an American paper is the first pattern of this creamer. It is claimed that cold water is more effective than air in bringing the temperature of the milk down to the desired degree, and that when ice is added to the water in which the cans are submerged, the whole of the cream will be raised in ten hours. The cans have a tap at the bottom for with-drawing the milk, also a glass pannel or window as shown in Figure 2 to show when the milk is all drawn from under the cream. In some of the methods in this system the cans are attached to the cooler, so that the milk and cream can be withdrawn without removing the cans, and in one of them, called the "Champion Creamer," the cans have conical-shaped bottoms protruding through the bottom of the cooler. At the point of these cone-shaped bottoms the outlet tap is fixed, and the window so placed near the tap, that when withdrawing the milk the cream line is easily seen.



The "L'Original Creamer," called the "Double Cooler," has a tube up through the can which stands upon raised bearings on the bottom of the cooler, in order to allow the water to rise in the tube, thus facilitating the cooling process. Where running water could be availed of, and this tube made the inlet, there is no doubt the effect would be considerable.

The "Little Gem" is still another on the same principle. It has cans made in elongated form, so as to break the density of the milk, and present a larger cooling surface. This excellent arrangement, besides being supplied with inlet and over-flow pipes for running water, has outlet pipes for the milk, so that there is no lifting of the cans when full. But the chief improvement in this creamer is the ventilation, as will be observed in the accompanying figure, the cover of the milkcans are raised, and have each an

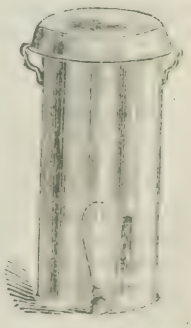
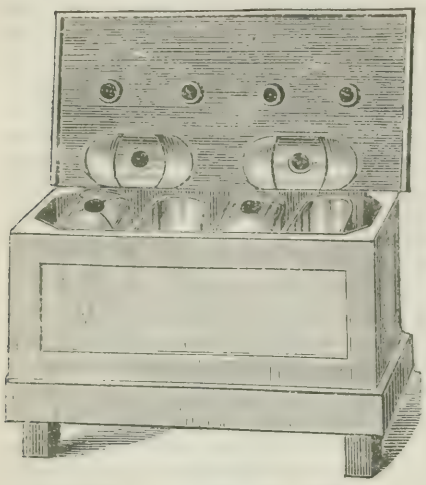


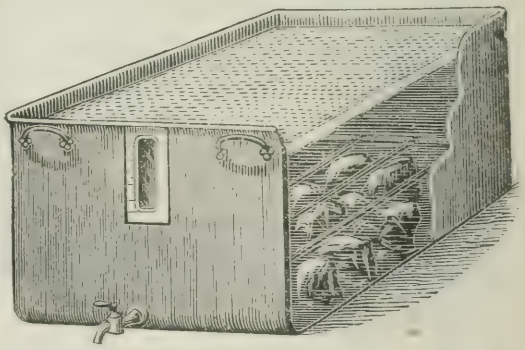
Fig. 2.

aperture on the top to allow the animal heat or rather the animal odour or gases to escape, and I am certain that the keeping quality of the butter is thereby improved. Many of the most practical dairymen in the country have learned by experience with the various deep-setting methods, that it is absolutely necessary to let this foul odour escape before putting on the airtight covers; otherwise the butter is effected in a way which is readily discerned when kept but a short time in warm climates. In the cover of this cooler there are tubes connecting with the covers of the cans, which can be closed by putting on the caps one or two hours after the milk is set, or as soon as the various gases have escaped.



Mr. O. S. Bliss, of Vermont, argues that in order to obtain the best results from deep-setting, the cooling must be applied at or near the surface only, because the watery portions of the milk part more rapidly with their heat than the oily portions, and becoming heavier than those below them, fall down by the action of gravity, and force up the lighter ones, which reasoning is certainly correct; but as far as the application of the cooling is concerned, it is diametrically opposed by Kellogg's apparatus for raising cream. This is the latest invention of the kind.

It consists of a vat or tank, which is filled about one-quarter of its depth with pure, clean ice in large pieces compactly placed and fixed by bars or grating to the bottom of the vat, as represented in the accompanying engraving, copied from the *Scientific American*. The vat is then filled up with milk, and the cream then may be removed in about forty minutes, leaving the skimmed milk fresh and sweet, to be drawn off by a tap at the bottom. It is claimed that this method works equally well in all climates, and so theorests differ. No man can be certain that his theory is perfect, or that his belief is true, unless he is previously certain that his knowledge is correct. Individuals are sometimes fully satisfied that they are right until new facts prove them wrong. So while the most scientific and practical men differ on essential points, there is little probability of us soon having an apparatus which will be universal. No tailor can make a coat to fit every person, neither, is any experiment equally applicable to all. It is certain however, that this matter as in every other, there is no excellence without care and attention—failure is sure to follow neglect. Much loss has resulted to those who have adopted deep-setting from improper cooling.



An excellent plan where ice is used is to have a cooler built at the end of the dairy room to which is attached the icehouse, and the icebox so arranged that it can be filled from the icehouse through an opening in the wall. If cold running water is to be relied upon for cooling I would adopt the plan of central tubes, having an inlet pipe for each can of a set. With either of these methods there need be no misgivings if properly arranged and attended to. The cream will be sufficiently raised in less than twenty-four hours so that only two sets of cans are necessary. A great saving of labour is affected, and where either ice is convenient or coldwater abundant—and other circumstances not unfavourable success is almost certain, and I do not hesitate to recommend their adoption while cream is to be separated from milk by any method of setting. But Mr. A. A. Ayer, of Montreal, is of opinion that the system of separating cream

from milk by centrifugal force, is destined to supercede all others in course of time—at least as far as creameries are concerned.

The churning of whole milk has this serious objection, that whatever impurities there may be in the milk, are taken up in the butter, thereby impairing its quality. But there is perhaps no other method (except that of the centrifugal), by which so large a percentage of butter can be obtained.

Tubs and Packing.

A great deal of good butter is lost by being improperly packed in poor tubs. Some manufacturers, whose only care it is to get butter off their hands in good condition, know but little of the difficulties which the dealer and exporter has to contend with, caused by want of attention to this particular. For home market, matallic pails and crystal jars answer a very good purpose; but for exportation or for long keeping, it is generally considered that the wooden tub or keg answers the best purpose if properly made of the right material. Tubs or kegs made of sawed staves can never be depended upon, because of their tendency to absorb and retain impure taints; hence all tubs or kegs should be made of *split staves* of some timber which will not impart a disagreeable flavour to the butter. *White oak* is certainly the best. *Ash* makes very good tubs when properly seasoned. *Beech* is a clean timber free from odour and makes excellent tubs. Hemlock, when sound, is not objectionable, and spruce answers when better cannot be had. Poorly made cheap tubs must be entirely rejected. Tubs, however well made, must be properly prepared; by first being filled with boiling water and left to soak for twenty-four hours. Then filled with strong brine and left to stand for two or three days. After that is turned out they must be rinsed with pure cold water and rubbed all over the inside with fine salt.

The best kind of tub is made somewhat tapering, of heavy staves, with heads provided at both ends, as for a barrel, so as to be perfectly water tight. In packing, the tub is set on the small end, a sack of cotton is made to fit the tub, and into this the butter is packed until it reaches within an inch of the groove for holding the heading. A cloth is laid upon the top of the butter, and the edges of the sack brought over this and neatly pressed down. Then the head is put on and the hoops driven home. The package is then turned upon the large end and the sack of butter drops down, leaving a space on the sides and top. Strong brine is then poured in through a hole in the small end until the tub is full; when the hole is tightly corked, and the air is effectually excluded from the butter. Good butter packed in this way will keep in good condition for more than one year.

Butter-Making by the Centrifugal System.

By S. M. Barré, Professor of the Dairy School at St. Marre (Beauce), Province of Quebec.

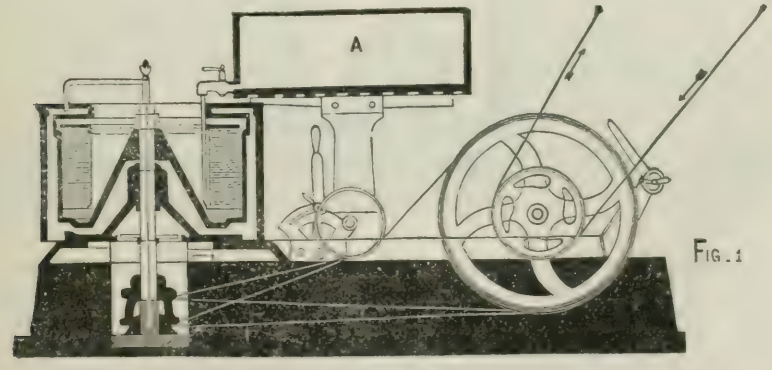


Fig. 1

Figure 1.

In explanation to those to whom this subject may be new, I would say that the separation of the cream from the milk, is effected in this machine entirely by contrifugal force. Cream is of less specific gravity than milk, and for this reason in the old system, it gradually separates from the milk and rises to the surface. The action of centrifugal force, is to throw the heaviest materials furthest from the centre ; placing the new milk in a cylinder, and revolving rapidly, the heaviest portion (the skim-milk) is thrown to the circumference, and the lighter part (the cream) remains nearest the centre. Cut No. 1, represents the machine ready for use. As it runs at high speed it is necessary to have it set upon a good foundation. The large size machine with twenty-four inch cylinder requires two-horse power to run it, and the small size with fifteen-inch cylinder one-horse power.

The second cut represents a sectional view of the working parts of the centrifugal. It consists of a wrought-steel drum or cylinder fixed upon vertical axes, and in which the milk is separated. A wrought iron casing surrounding the drum to prevent accidents. The tube through which the milk is fed, and the cock to regulate the flow of milk can be seen in Figure 1. E is the tube through which the cream is thrown off. C is the tube through which the milk is drawn off. B represents the plate, above which the skim milk rises through small apertures next to the circumference of the drum. The working of the machine is as follows : The new milk is placed in reservoir A, Fig. 1, and fed through the tube in the cylinder, which, revolving rapidly, the centrifugal force separates the different substances according to their specific gravity. The impurities being the heaviest, collect upon the sides of the cylinder, the skim next in weight collects next, and by constant inflow of new milk, is forced through the apparatus in plate B, and is continuously drawn off through tube C. The cream collects in a wall upon

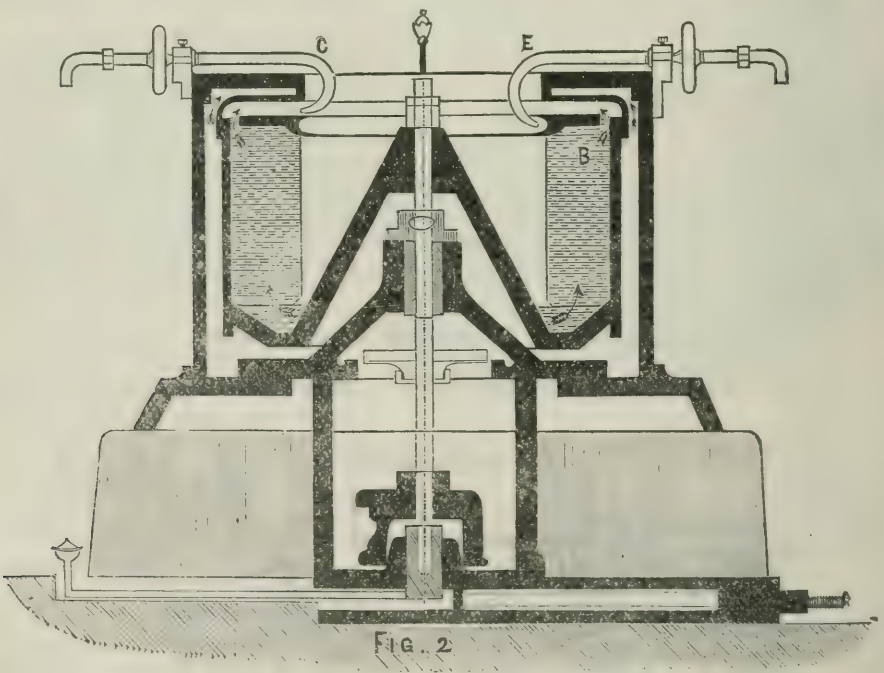


FIG. 2

the inner surface of the skim milk, and flows off in a constant stream through tube E. The tubes C and E can be moved at pleasure, nearer the circumference or centre of the cylinder, and thus the richness of cream can be regulated without stopping the machine or interfering with its working. From the above description it will be seen that after the machine is once started, it works continuously for twenty-four hours, which is as long as

they ordinarily should be run without cleaning. The great advantages and economy of this improved method will be readily seen and appreciated by all dairymen. The milk is brought but once a day to the factory—in the morning. It is put into the Burrell receivers, and by means of cold water, ice or steam is cooled or heated at will. If the milk comes in large quantity, at a temperature above 70 F., and particularly if the morning milk is mixed with the evening milk, which increases the tendency to decomposition, it is better to cool it a little to keep it sweet until the end of the skimming process, and also to give back the residue to the farmers in a sweet state. But nevertheless, in order to obtain thorough skimming it must be heated to a temperature of 85° or 88° F., and only in small quantities at a time, so as not to risk acidulation of the liquid. The milk is then introduced into the machine. By means of two centrifugal apparatus of Danish make the cream of 1,600 to 2,000 lbs. of milk may be separated in an hour. The cream thus obtained is immediately cooled to a temperature at least 44° F.

Professor Barré gives the following as the advantages of the centrifugal system :—

"First.—The transportation of milk but once a day, which so far has been considered impossible in American butter factories. The cost of transportation of the milk is thus decreased by half.

"Second.—A great saving of time in skimming. By the old method the milk required thirty-six hours setting before skimming ; by this system 9,000 pounds of milk will yield its cream in four hours, and farmers can carry back their skimmed milk at once.

"Third.—More thorough skimming and greater yield.

"Fourth.—Centrifugal allows of the acidulation of the cream being brought under control.

"Fifth.—The butter obtained is finer and of superior quality. The centrifugal extracts from the milk, from the cream, and consequently from the butter, a large amount of impurities, which adheres to the sides of the apparatus, and which the old method could not remove.

"Sixth.—A great saving of ice.

"Seventh.—Economy of room required and expense in conducting a creamery."

First.—The economy on milk transportation is no small item. The saving of time is also an important item. Here again is a saving both of time and temperature. The longer the milk has to remain in the creamery, the greater is the risk from the various contingencies to which it is liable. And in proportion as it is quickly rendered marketable and passed out of dairymen's hands are these lessened.

Second.—More thorough skimming. In a report of Prof. Fjord's, dated October 18th, 1882, we find the result of experiments conducted by the Danish Government during the years 1881 and 1882. We make the following extracts :—

"The principal aim of Prof. Fjord's has been to compare the butter yield by the six different systems. The Centrifugal; 'Ice,' ten hours' setting ; 'The Ice,' thirty-four hours' setting: Water at 50° F.; 'The pans,' and 'Churning of milk.'"

From the accompanying table No. 1, we see that the gain of the centrifugal machine during twelve months has been twenty-three per cent. over "ice" ten hours'; fourteen per cent. "ice" thirty-four hours'; forty-one per cent. water at 50° F.; fourteen per cent. over the pan system ; and seven per cent. over churning of milk.

TABLE No. 1.

1881 and 1882.	Proportion of Butter yield.						The Centrifugal has given more Butter per cent. than				
	Ice 10 hours.	Ice 34 hours.	Water at 50° Fahrenheit 34 hours.	Pans 34 hours.	Centrifugal.	Churned Milk.	Ice 10 hours.	Ice 34 hours.	Water 50° Fahrenheit.	Pans 34 hours.	Churned Milk.
April	93.1	100	81.1	102.0	113.0	107.7	22.3	19.9	40.5	11.7	5.8
May	92.2	100	81.7	97.5	111.3	98.8	19.8	11.3	36.3	14.2	12.7
June	94.4	100	86.8	98.4	109.6	95.9	16.0	9.6	26.2	11.4	14.2
July	.....	100	. ..	.....	. ..	.....	.....	.....	.....	.....	.....
August	94.8	100	86.5	97.2	109.2	101.3	15.1	9.2	26.2	12.3	7.8
September	94.7	100	84.0	97.5	111.6	103.4	17.9	11.6	32.7	14.4	8.3
October	92.4	100	81.8	102.0	117.6	113.6	27.3	17.6	43.7	15.3	3.5
November	91.5	100	77.5	99.0	120.2	115.1	31.4	20.2	55.1	21.4	4.5
December	92.0	100	79.1	101.0	119.6	115.0	29.9	19.6	48.0	18.4	4.0
January	92.3	100	79.7	100.9	118.0	110.9	27.9	18.0	50.1	10.9	6.4
Feburary	92.4	100	83.4	101.3	116.2	110.3	25.2	16.2	39.4	11.8	5.4
March	93.1	100	87.7	100.5	114.0	108.0	22.7	14.2	45.1	13.6	5.6
Average	92.6	100	81.9	99.8	114.6	.....	23.3	14.3	41.0	14.1	7.1

Third.—The churning of milk comes next to the centrifugal as far as obtaining quantity; but analysis showed that butter obtained by the churning of milk contained a little more "foreign matter" than butter obtained by the other systems.

In our centrifugal factory in St. Mary (Beauce), we obtained twelve and a-half per cent. more butter than most factories running on the pan system.

Fourth.—We control the acidulation of the cream. This is one of the most important points in butter-making, and the only means of producing at will a butter sure to keep. It is also the means of obtaining cream of uniform ripeness, and thus enabling us to churn it equally clean.

Fifth.—The butter is purer. Few things absorb impurities and even odours more easily or more readily than milk and cream, and if they are allowed to stand with all the impurities, which are revealed by the centrifugal, in them, they must necessarily have their delicacy impaired, and this is without doubt transmitted to the butter.

An important fact lately developed by Dr. Sturevant is its (butter made from the cream separated by the centrifugal) melting point being remarkably high, 98° F., the melting point of ordinary butter being 94°.

The same reasons as mentioned above in regard to the butter apply to the skim milk, and renders it remarkably sweet and nice, so that it commands a higher price than the ordinary article.

Sixth.—A great saving in ice an important consideration. As the best results from the centrifugal are obtained when the milk is used soon after milking, the saving of ice is very great. As the amount of cream obtained averages about fifteen per cent. of the milk, and as by this method nothing but the cream need be cooled, it is evident that there will be a saving of eighty-five per cent. of the ice used in a creamery where the "Ice system" is employed. This alone renders the machine a valuable one.

Seventh.—As the plant necessary for a successful creamery is expensive, economy

is an important item. By separating the cream immediately on receipt of the milk, all room necessary for vats or pans is saved, except for a small vat for heating milk, and a creamvat.

The space necessary for the centrifugal is very small, not more than four by eight feet, for the large size machine. The expense of maintenance is also greatly reduced by doing away with the large vats or pans and other appurtenances now necessary.

The Choice of a Skimming Machine.—Mr. Fjords, professor of the Royal Agricultural College of Denmark, having shown by a series of practical experiments carried on with most of known centrifugal apparatus, amongst others those of Burmanster & Wain, Delaval, Lefeldt, Fresca, etc., that the most simple, most effective, and requiring the least motive power relatively to its capacity, was the Danish or Burmanster & Wain, says "I adopted it, and I at present consider it to be the only one adapted to the requirements of our co-operative dairies or butter-factories."

I here reproduce some of Prof. Fjord's figures in this connection :—

——	Pounds per hour.	Average speed evolutions a minute.	Average quality of fat left in skim-milk.
Burmainster and Wain, small size, De Laval...	300	2400 6000	0·12% 0·18%
Burmainster and Wain, large size, De Laval...	450	2400 6000	0·22% 0·31%
Burmainster and Wain, small size	870	1950	0·15%
Burmainster and Wain, large size.....	1280	1950	0·27%

This fact is fully demonstrated, viz.:—That the Danish machine can skim three times as much milk as the De Laval and leave less fat in the skim-milk.

Owing to the cream being sucked by the air into the skim-milk, the Lefeldt centrifugal machine loses nine per cent. of cream.

The Fresca apparatus does not work continuously. At the end of every hour the machine is stopped, the cream taken out of the drum, and the operation begins again.

The Centrifugal Controller..—One advantage which specially distinguishes the centrifugal of Danish make, is that a controlling apparatus has been fitted to it, which shows exactly the quantity of cream contained in milk sent by each farmer to the factory. This point is a very important one for our co-operative dairies, and will enable us to pay for the milk not only according to quantity but according to quality, alloting to each farmer the true proportion of product contained in his milk, and allowing him to profit by the care and good keeping of his stock.

The capacity of the Danish machine has been increased to 1,200 lbs. per hour. It has lately been improved in other directions. The newest improvement consists of an apparatus indicating the speed of the machine, and also the quantity of milk flowing into it. This new contrivance simplifies the work and renders it more efficient. The experiments of Mr. Fjords shows that the Danish machine can easily be driven by horse power. We quote his figures

For 2,000 evolutions a minute and to skim 2 to 300 lbs. per hour it requires ½ horse power.
" 2,400 " " 3 to 400 " " " ¾ " "
" 2,800 " " 4 to 600 " " " 1 " "

All the new improvements referred to above are to be had with the Danish machine only.

The centrifugal system is now the most perfect, most simple, and most rational, and I not only recommend it to dairymen of this country, but I say that any one

intending to erect a creamery will certainly make a mistake if he adopts any other system.

Here is a grand field for scientific investigation. The present generation has made considerable progress in the use of scientific appliances to almost every other branch of agriculture, yet when compared with the progress made in arts and manufacture, navigation and locomotion, we wonder that in this age of telegraphs, telephones and electric light the progress in agriculture has not been more rapid. The centrifuge, however, seems to indicate that in a short time we may expect to see butter of the finest quality in the market in perfect condition, a few minutes after the milk from which it is made is drawn from the cow.

From time immemorial it has been believed by our forefathers that the exposure of the milk to light was the pre-requisite to successful butter-making, and traditional of all things is perhaps the hardest to contend against. Therefore in order to bring about a general improvement in this interesting and important branch of agricultural industry, there must be imparted a more thorough education in the principles which underlie the practice. Education is the only remedy, and the history of the nations clearly teaches us that systems must first be inaugurated through the instrumentality of the government of the country.

Sweet or Sour Cream.

Most of the American professional dairymen incline to the belief that in order to procure a good keeping butter the cream should be sour. The Danes, however, hold to the belief that in order to procure butter suitable for exportation the cream must be churned when sweet, or but very slightly acidified. It seems to be very generally admitted that slight acidulation of the cream produces a desirable aromatic flavour in the butter, but certainly when this acidulation is carried too far, it entirely destroys keeping qualities, therefore, in order to procure a good quality of butter that will keep in good condition, it is necessary to sacrifice that much sought for aroma and churn a sweet cream.

Sour cream cannot make more butter than sweet, because fermentation cannot create fat, but can and does destroy it. The difference in quantity in favour of sour cream is due to curdled casin in the butter; and that is the reason why butter made from sour cream will not keep as well as that made from sweet. The keeping quality of butter depends upon its purity in oil globules, and its freedom from callous and seacharine matter, the more perfect these fat globules remains in the butter the better its keeping quality. Whatever is gained in quantity is at the sacrifice of quality.

Butter cannot be consumed from day to day as it is made, that which will retain its sweetness for months is certainly the more valuable, so except when it is made for immediate use only, sourness must be avoided. That which is called the ripening process is in fact the rotting process. I do not know of any other article of food in common use which would be supposed to keep the better, if the rotting process is commenced before the preservative is applied. There are some people of peculiar tastes, who, before eating their venison prefer to have it buried in the ground for a time, in order that it may become what they are pleased to call ripe. The effect is tenderness of the meat, but it is accompanied by a dreadfully unwholesome odour, and the testimony of the medical profession is almost entirely against the practice.

Many tubs of butter now in store are no less offensive to the sense of smelling. This is certainly not a desired condition, nor is it ever intended, but simply the result of allowing decomposition to commence during the manufacture of the butter.

Some considerable time must elapse before Canadian butter can be retailed out of the stores in English towns, therefore its keeping quality is of the utmost importance; and not until it has a good character established for this property, will Canadian dairymen realize the highest obtainable price.

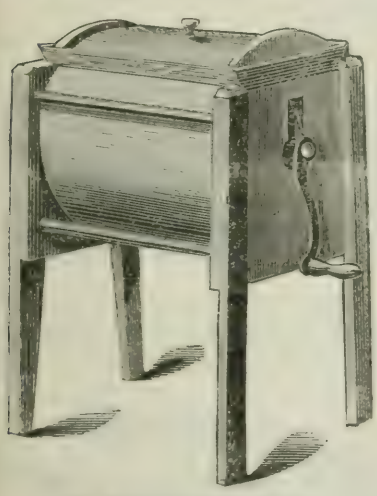
There is no probability of the market ever being over-stocked with first-class butter. Improvement in quality brings increased consumption which is followed by advancement in price.

THE CHURN.

In the model-room at Ottawa, there are several hundreds of models of different patented inventions for the purpose of churning. Most of them are ingeniously contrived with a view to the lessening of manual labour. There has been an immense amount of money expended on patent churns. Some of them seemed to be received with popular favour for a time; but it is a remarkable fact that not one has given general satisfaction. There are but few farmers who have not experimented with several of them; yet almost all have fallen back to the old-fashioned dashchurn. The general conclusion among butter-makers seems to be whatever advantage may be gained in the saving of labour in churning, is more than counter-balanced by the necessary labour of keeping the machine perfectly clean and in good order.

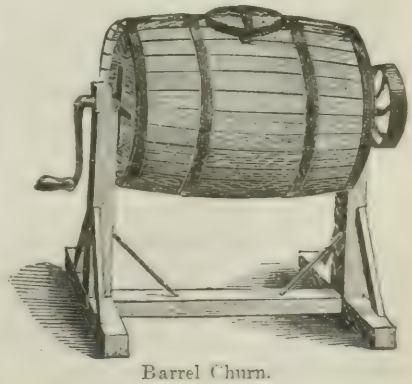
The chief objection to the common dashchurn is, that it requires a considerable amount of power to keep it in motion; many and various means have been devised and adapated for the purpose of supplying the needed power; and now this churn is in more general use than any other, in factories or private dairies.

A few years ago Mr. Blanchard of Concord, N. H., introduced a very practical invention which seems to have superior merits, and has lately been much in use in the eastern States and eastern Provinces. It is now out in an improved form, called the New Blanchard. The special advantage claimed for it is an improved form for the body of the churn. The top is made circular, as well as the bottom, so that all the cream must be churned alike at the same time. It is stronger and more durable than the old form. The new dasher is more simple than the old, requiring much less power to turn it. It is a simple construction having no cogwheels or gearings. The reverse motion of the dasher gives a pressure to the butter by which the buttermilk may be all washed out, and the salt worked in without removing the dasher. The dasher is easily removed, and the body of the churn having no inaccessible angles or corners is kept clean without difficulty.



Blanchard Improved Churn.

Mr. A. A. Ayer thinks the purest butter can be obtained by the use of the revolving barrel churn without any machinery or dasher inside, because it can be the more readily kept free from every particle of impurity which might taint the cream, and which is hardly possible with dashers having joints. The barrel churn should be made with very little bulge, as is represented in the accompanying figure, with attachments for either hand or power. In some factories this gives entire satisfaction. Mr. Haggard, however, after discussing the merits and demerits of the various highly recommended churns, concludes that the best is the simplest—the old-fashioned upright churn, arranged so that the dasher can be worked with horse or other power.



Barrel Churn.

Cream Pails.—For holding the cream tinned iron pails of sufficient capacity to hold each a churning, are the most convenient, because in them the temperature can be regulated by placing them in cold or warm water as required.

Temperature.—In regard to the proper temperature for the most successful churning of cream, there seems to be but little difference of opinion. Indeed it is the only point on which nearly all are agreed. That of from 56° to 64° Fahrenheit varied a little according to the tem-

perature, but if churned above 64°, the grain and colour of the butter will be injured. Rapid churning is often done at a sacrifice of quality. If the cream is in good condition and at the proper temperature, the operation need not occupy more than forty minutes, and to have it done in less than twenty minutes is false economy. In this matter practical experience is essential.

Washing and Working.

This important point in the process of butter-making has been freely discussed for about half-a-century, and yet the matter seems to be but imperfectly understood. I have read almost everything that has been written on the subject, and am amazed to find so much difference of opinion still existing among those who profess to know the truth of the matter. Some asserting that washing is quite unnecessary, while others believe it to be of the most essential importance. I have had considerable experience in the matter, and am led to the following conclusions :—

First.—That properly worked, unwashed butter, for immediate use, will have more of that delicious aroma so much sought after by those of fine discriminating tastes.

Second.—That in order to make a butter that will keep in good condition, all the casein or curd must be taken off it, and that this can be more effectually done by washing, and in one-fourth of the time that it could be done by working alone and when the performance is properly understood; this important item of saving of time to the farmer's wife is sufficient cause for its mere general adoption.

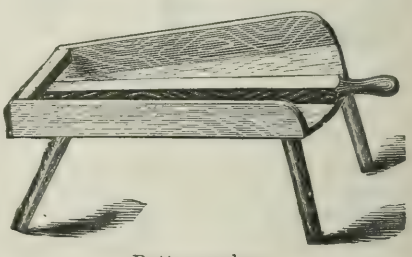
Third.—That the sooner the casein is taken out of the butter the better will be its keeping quality.

Fourth.—That the best method of washing butter is to separate it from the buttermilk while it is in a granulated state, or before it is gathered into a solid, and put into a weak brine made of pure cold water, and the best quality of Liverpool dairy salt. This can be done with little or no action on the grain of the butter.

Fifth.—That after the casin or curd has become solidified through the influence of lacitic fermentation, no amount of working can remove it, without the application of a solvent or menstrum, and that the more the butter is worked, the more thoroughly is the injurious element incorporated with it.

Sixth.—That immediately after the casein is washed out of the butter the salt should be added, and that it cannot be evenly distributed without a certain amount of working, but this need not be done in a way to injure the grain of the butter. Then the butter must be allowed to stand for time that the salt may be dissolved, after which it must be worked a second time to expel the residue of moisture. The working should be done more by a pressing than a drawing process. Much working turns the butter into the consistency of salve.

A very good butter-worker for private dairies is the one in common use, and consists of a lever on an inclined slab of hardwood, with beveled sides about four inches high. At the opening at the narrow end the drippings fall into a pail below.



Butter-worker.

There are many other inventions for the purpose, but this is the simplest, which bears about the same relation to the others as does the common dash-churn to the complicated arrangements. It is cheap, easily cleaned and convenient.

Salting

There is but little difference of opinion among the most practical butter-makers, as to the quality of salt required to preserve butter in good condition. About one oz. of salt to one lb. of butter, if properly applied, is enough, but there is a common error in using salt that is too coarse, it does not dissolve quickly when mixed with butter, but remains in large grains, consequently the butter is not salted evenly and its keeping qualities are thereby impaired. The salt should be ground very finely and added to the butter as

soon as the butter-milk is washed out, and while the butter is yet soft, so that it can be thoroughly mixed without excessive working, which invariably injures the grain of the butter. There are no impurities found in common salt in sufficient quantities to be in any way deleterious. The most common impurity is calcic chloride which is found to some extent in rock salt, and denotes its presence by imparting a peculiarly pungent taste, such salt, however, is not in general use.

Marketing.

Herein is where creameries or co-operative factories have the greatest advantage; not that the butter produced in them is in any way superior to the best that comes from farm dairies, but that it is much better than the average home-made, under the present defective system; and being of more uniform good quality in large quantities, it more readily finds the best markets at a higher price.

Many of the home dairies have not the necessary facilities for making and preserving a first-rate article, and consequently lots gathered together at the country stores, as under the present system, invariably include many different grades; and a few packages of bad naturally affect the whole. Then, again, in country stores, for want of proper accommodation, the butter collected from makers on a small scale is often exposed to impure surroundings, and sometimes the different grades are mixed together, making what is known as variegated butter.

How will we gain a just reputation for good butter until this mixing, exposing, careless, slipshod, deteriorating practice is discontinued.

The demand for fine butter far exceeds the supply, and the establishment of butter dairies as schools of instruction throughout the Province, will certainly tend to rapid improvement in this industry, both as regards creameries and home dairies; and whatever benefits any branch of agriculture must benefit every individual, and add to the wealth and prosperity of the nation. A hopeful sign of the times is that the Government has resolved on economically stimulating agriculture in its various branches. The development of agricultural wealth in this country has practically an unlimited power expansion. Many parts are peculiarly suited for butter-making, and with enterprise stimulated it will doubtless become one of the most famous butter-producing countries in the world.

Pastures.—Grass is the most natural food for milch cows, and a long established fact is that the best butter is obtained from old pastures where the natural grasses abound. This is a subject demanding much consideration on account of its importance in production of fine butter, but want of space prevents full discussion here. Timothy, it seems, is supposed to be by some the only grass worthy of cultivation. This is an error, adhered to only by those who do not thoroughly understand the matter. It is an excellent grass for hay, but for pasture is unenduring.

Permanent pastures should be seeded with a mixture of grasses, which will continue to furnish an abundant supply of fresh green food throughout the season. To insure this the following kinds should be sown and encouraged: Kentucky blue or June grass, meadow foxtail, orchard grass, red top, hard fescue, meadow fescue, sweet vernal, crested dogstail, and white clover. Pastures composed of those grasses improve by age, and it is doubtful whether land can be devoted to any other crop that would be as profitable.

Over-Stocking a Common Error.

As the pasture gets bare the cows must increase their activity, and labour hard, and which, even if by that means they can obtain sufficient food, it tends to decrease the flow of milk. Grass plants, when the hearts are eaten closely out of them, do not reproduce leaves so readily as when allowed a fair chance; and being feeble, are more liable to be injured by drought, and ultimately replaced by noxious weeds. Close cropping of pastures is folly in every way, without any possible advantage.

The most reliable substitute is in lucerne (alphalfa). It is a deep-rooting perennial, which, although not equal to grass for milch cows' food, produces abundance of green feed if properly encouraged, even in times of drought. It is most beneficial when culti-

vated by itself, and cut for use as required when pasture is difficult, but a heavy yield of it need not be expected from land in poor condition.

Winter Food for Cows.

Grass for hay should be cut before it is over ripe. There are many things in connection with farming operations, which admit of difference of opinion, and of which one cannot be positive. But of this one thing I long ago became convinced, and am now more confident, that hay made from grass cut in a green state, or just before it comes in bloom, is much better adapted in everyway for animal food than from grass not cut until fully matured. And now I wonder why so many cling to the fallacious notion that grass should be ripe before it is cut for hay. As it ripens it loses its nutritious qualities and turns into woody fibre; then it is not relished by animals, and is harder to digest. Hay properly cured in a green state is much more relished by every kind of grass-eating animal. It is more easily assimilated, and sufficient nutriment is obtained from less bulk consumed. I have proved to my own satisfaction that early cut hay will give as good returns when given without additional food—as late cut with a moderate ration of meal and roots.

For cows in milk good oat straw it preferable to late cut timothy, and when fed along with ordinary rations of meal and roots will give better results than when fed the same amount of meal and roots along with hard timothy hay. Indeed the best method of drying up a milk cow is to feed her solely on ripe timothy hay. While cows fed on properly cured hay, which is nearly equal in nutritive quality to the fresh grass of pastures, and with the addition of a few mangolds or carrots, will produce as much milk and butter as if on good pasture. The principal difference would be that if there is much red clover hay among the timothy the butter will be more oily; but for winter use this is not so much of an objection. But in this business of butter production it is of the utmost importance that cows be brought through the winter in good condition. The cow that is wintered on poor food, and comes out in the spring thin in flesh, will yield but a comparatively small quantity of milk, and that of poor quality.

Wintering cows on a cheap scale is false economy in the extreme. And where the milk of poorly kept cows is delivered at the factory on an equality with good milk produced from well fed and well cared for herds, it is, in fact, the taking of, from the owners of the latter and appropriating by the former, a certain amount of property without accounting for it. And this unfair dealing, of which I have heard complaints, should be regulated either by a testing system, and allowing only value according to quality, or else excluding such milk from the factory. Early cutting of hay gives this other advantage besides that of superior food. The meadows are made more enduring and yield better returns year after year.

Salt for Cattle.

All animals require a certain amount of salt, more or less, according to the character of their food, and milk cows should have free access to it, so that they may regulate their appetites to the daily use of small quantities of it.

But one of the most important essentials is an abundant supply of pure water, so provided for that they may have easy access to it at all times. No cows can reasonably be expected to yield a large quantity of milk of good quality, without consuming a large quantity of good food and drinking an abundance of pure water.

Soiling.

When quantity of milk is the chief object, the plan of keeping the cows in stables and yards throughout the summer and feeding green food in abundance has many advantages. It produces more milk than even good pasturage, it economizes food, saves fencing, and increases immensely the quantity as well as the quality of the manure. But where choice butter is desired, it has this serious objection, that the butter is deficient in flavour and colour, and is more of an oily nature than that made from upland

pasture. There are many small farmers near large cities to whom a judicious system of soiling would give greater advantage than to those situated where abundance of good pasturage is easily obtained. It, of course, involves a large amount of labour, but wherever it has been judiciously followed, if the butter made was for home consumption the results have generally been satisfactory. Rye sown early the previous fall generally gives the earliest green fodder in spring; but here this year the lucerne was ready for cutting before the rpe, and was consequently used in preference to the rye, because it is relished more by the stock and gives a better quality of butter. I am now, July 10th, cutting the second crop, which is eighteen inches high; for although I have good pasture I daily give my cows some cut green fodder, because it helps to keep heavy milkers in good condition. Red clover is abundant this year; but when it is likely to be deficient tares and hungarian grass should be sown at different times throughout the season in such quantities as are likely to be needed. Corn sowed thickly the first week in July gives an excellent supply for September. Sweet corn for this purpose is much preferable to any other. There is nothing, however, that will yield nearly so large a bulk per acre of good nutritious green food as lucerne; and anyone may be convinced of this by giving it a fair trial.

Cows for the Dairy.

We do not now, nor is it possible that we ever shall possess any breed of cattle that will combine in itself all the good qualities and peculiar advantages which would make them universally desired. The tendency to convert the fat-forming elements of food into adipose tissue, and the tendency to convert the same elements into cream, cannot exist in perfection in the same animal, nor is there any breed entirely uniform either in quantity or quality of milk even on the same feed—indeed there is no breed in which the individuals do not vary much in both respects.

Every breed of cattle we possess owes its origin to a mixture of race. It is possible to improve a race by good feeding, and care, and skill in selecting breeding animals for a particular purpose.

The animal which has the faculty of assimilating a large quantity of food into milk—in other words, the animal which gives the largest quantity of the richest quality of milk, for the amount of food consumed is the most to be desired for this purpose.

Our common cows, as every one is supposed to know, are not indigenous to Canada, but they are called native, because as with the human race, they are considered to be a native of the country in which they were born. But as to what breed or breeds they originally descended from it is now impossible to say with certainty.

The settlement of Champlain in Quebec 275 years ago was, (with the exception of that of Capt. Newport, in Virginia,) the first in America, and it is quite probable that some time elapsed before the first cows were imported from Europe, but it is pretty certain it was from Europe they came. There was not much distinction of breeds at that time, and it is very likely the first importations were some of the best of the common stock which formed the basis of our Canadian cattle.

About fifty years ago, the importation of superior animals of the different improved breeds was commenced, and since then has been very frequent by enterprising agriculturists, with the view of the improvement of the original stock. The offspring of all these animals of the different breeds, has been so widely disseminated throughout the country, that now the common cow may be said to be a mixture of all breeds, but in the eastern part of Ontario they partook most of the Ayrshire because the first importations of pure bred animals were of that breed. The calves raised have not always been selected from the best animals, but a very general practice has been to raise the calves of the best milk cows, so that now upon the whole the common Canadian cow would probably be, (if the same means were adopted for the full developing of her milking qualities, as has been used for the full perfecting of other breeds for special purposes) as well adapted for the dairy as any known particular breed. And now especially for rough pasture lands, because being acclimated, they are hardy—and they industriously search for food.

The Shorthorns, which are now perfection as beef producers, were at one time celebrated for their milking qualities, and the largest amount of butter ever made from individual cows in a given time was obtained from cows of this breed. Thirty years ago it was no uncommon thing to hear of Durham cows producing twenty and as high as twenty and a-half pounds of butter per week. It was on account of their productiveness as dairy cows that they were first celebrated in their native country, but latterly they have been bred so entirely with a view to beef production that now good milkers among them are the exception, and many of them do not give enough milk to raise their own calves, and I know from experience that crossing with bulls of the highest class of this kind does not generally improve the common cow, as a dairy cow, although it invariably adds to her size and appearance.

The Jerseys although never excelling in quantity have long been celebrated for the richness of what milk they give, and in this respect they are yet, and likely to be unsurpassed. Their beautiful head and peculiar appearance recommends them as a fancy animal, to be sought after by the rich and the curious, who readily pay high prices for the gratification of taste. For many years past they have been bred chiefly with a view to points of beauty, and they are now valued according to the degree in which this is possessed, and which consists mainly in a uniform grayish dim colour with the entire absence of white, small fine head with finely crumpled horn, black tongue, orange coloured ears, and tufts of black hair at the end of their tails. Too much deference to fashion has to some extent led to the sacrifice of their productiveness. It is asserted that butter made from their cream is superior to any other, but this is very doubtful, and I know it is not generally so. The quality of butter depends more on the character of the food consumed than of the breeding of the animal. Whoever chooses any particular breed of cows expecting that it will secure to them all good butter, without attention to the essential particulars, will find themselves sadly mistaken. It has been proved by repeated experiments that crossing the Jerseys with the common cows does not improve them either in appearance or productiveness.

The Ayrshire breed of cattle originated in the county of that name in Scotland from a cross of the Dutch cattle upon the native race of the locality, and are related to the Shorthorns through their ancestry a hundred and twenty-five years ago, cattle were brought into Ayrshire from the English county of Durham where the Shorthorns (formerly called Durhams) were originally bred; the progeny of these were soon scattered throughout Ayrshire; care in breeding and management helped to produce what soon became a very valuable breed for the dairy. In the moist pasture country on the south-west coast of Scotland the climate was such, that during the winters some hardships must be endured, such as severe wintery weather, and poor feeding when the pasture was bare. The purpose for which the cattle were used was solely the production of butter and cheese; the production of beef was not an object—only the old and inferior animals being fed for the butcher. The growing demand for these dairy products stimulated the growth and improvement of this breed, and they, after being bred for more than a century with special regard to milking qualities, became noted as producing more milk and butter for the quantity of feed consumed than any other breed in existence. This quality they still possess, and the Ayrshire dairy district still retains its reputation for its superior dairy products. The Ayrshire cattle are one of medium size, compactly built, with such a perfect set of digestive organs that they assimilate food with the least possible waste, thus converting into milk all the available portions of their food. They are not only large, but rich milkers; they are industrious feeders and hold out their flow of milk well to the end of the season; crossing them with the common stock never fails to produce marked improvement, but too early breeding in this country has in some instances had the effect of reducing them in size. That they are not more generally known throughout the country is probably the fault of the breeders, who do not indulge in publishing their merits as much as some of their competitors do; they are more valuable to keep than to sell.

Mr. James Drummond, of Petite Cote, near Montreal, is one of the most practical farmers in Canada, has in connection with his dairy at present, eighteen Ayrshire cows of a large size and of his own raising, from which he realized during the past season,

for butter and cream, something over $2,000. One of the herd produced by actual test of seven days' milk eighteen and a half pounds of butter, and several of them over fifteen pounds, and it is doubtful whether there is on this continent another herd of the same number of cows capable of producing as much butter. Some may doubt this extraordinary statement, but if such will take the trouble I have to find out the facts, they will be perfectly satisfied that the account is not exaggerated.

Herefords, Devons and blacks are all better adapted for beefing than for dairy purposes, so where butter-making is a specialty, the common stock and the Ayrshires afford ample scope for the selecting or raising of choice cows for that purpose; and by proper selecting, careful breeding and raising, a more profitable race of milk cows can be obtained than is yet to be found in the Province of Ontario.

Our climate and much of our land is well adapted for the production of first-class butter, and the whole subject is one of great national importance to Canada, and is entitled to the fullest possible consideration and encouragement from both the Provincial and Dominion parliaments.

THE BEST AND MOST PRACTICAL MEANS OF IMPROVING THE QUALITY OF BUTTER PRODUCED IN ONTARIO.

By John Smith, Jun., Ratho, Ontario.

Awarded the Second Prize by the Agricultural and Arts Association.

Although we have reason to be proud of the position attained so rapidly in the quality and quantity of our cheese products, we are still having an unenviable reputation for a great part of the butter we produce. Statistics were given by the Treasurer of Ontario, in his last financial statement, which showed the rapid improvement in the cheese trade in the last decade; but with regard to the sister industry of butter-making, an opposite statement is made, so positive as to leave no room for doubt.

It is often good to be told the truth, however unpleasant, and this is what the Hon. Treasurer does in these words:—

"We make in Ontario over 45,000,000 pounds of butter annually. I regret to say, as Minister of Agriculture, that it is 45,000,000 pounds of a very inferior article. That is the verdict upon it in England, and other foreign markets, and there is no evading the unpleasant fact. It is very evident that with our large annual product, a very small percentage of increase in quality would add a very large amount to the total value."

We may almost be said to have commenced our cheese industry, by the adoption of scientific methods, and improved mechanical appliances, and also a good marketing system. This was owing to the introduction of the associated factory system. The knowledge disseminated among factory men by diarymen's associations (hitherto principally cheesemakers' associations), has also been an important factor in improving our cheese products. These associations have given us the views of gentlemen of large experience and scientific attainments, and have sent from factory to factory the most skilled and ablest practioners to instruct in the most improved methods; thus enabling us to produce a very uniformly good article, which has now given Canadian cheese an excellent reputation abroad.

Now, the means by which we have succeeded so well in the cheese industry, ought to be suggestive of improvement in the sister industry of butter-making. Although the industries are in several respects dissimilar, there is enough in common in the two processes, and the trade in one is sufficiently like the trade in the other to make reform in butter-making equally attainable. The great requisites for improvement may be briefly stated as, a general knowledge on the part of producers of those principles on which success depends, the adoption of improved appliances, and a better marketing system.

Were I asked what I considered the greatest hindrance to the improvement of our butter trade, I would be apt to say, "It is our present marketing system." This actually discourages each step in advance towards that gradual improvement that might otherwise

be expected. Unlike cheese, of which but little was used amongst us, and that little nearly all imported twenty years ago, butter has always been a staple article of diet, and, as a consequence, has been a staple article of barter between farmers and storekeepers; and the latter have always been so anxious to cultivate a trade with the farmers, that they have been afraid to discriminate in price for fear of offending some of their customers, and thus losing their trade. The two classes of producers—those who know how to make a good article, and those who do not—have thus been kept from that mutual improvement that would speedily result, if butter, like other commodities, were bought and sold on its merits. Just as surely as self-conceit would yield to self-interest, would a knowledge of the conditions requisite for the production of first-class butter then become general, and a first-class product become the rule, and not as at present the exception. As an illustration of the evil effects of the present mode of bartering butter, take the following too common occurrence—unfortunately, only the names are fictitious:—Mrs. Slouch and Mrs. Spry meet at the store to trade their butter. Mrs. Slouch, as her name indicates, is ignorant and slovenly, and knows little about the conditions requisite for producing good butter; as a consequence, she blunders along, once in a long while, perhaps, accidentally hitting the right conditions, and producing a good article—most likely in June, or September, when the temperature is about right—but generally the opposite of that, a greasy, speckled-looking combination. With great faith in the antiseptic properties of salt, she at least wisely surmises it should be well salted, and acts accordingly. Since salt is ever so much cheaper than butter, why should she be stingy with it, when she has a chance to sell it at the price of butter? So between two and three ounces to the pound are incorporated with the combination. Perhaps it's all necessary—who knows? Well, this is the stuff she has to trade when Mrs. Spry gets a squint at it. "Surely she will never get so much for that 'squash' as I got," she mentally exclaims; but she is mistaken. Mrs. Slouch gets just as much, although Mrs. Spry's is a much superior article. Is it to be wondered at that Mrs. Spry goes away with the conviction that it does not pay to make good butter, and acts accordingly? Instead of churning for about an hour every day, the capacity of the churn is the only limit, and a generous application of warm water, if it does produce rather a greasy-looking stuff, reduces the time of churning to fifteen minutes or less. It's all the same price, and there is thus a great economy of labour by making poor butter! Then with too many dealers, good, bad, and indifferent, are all mixed together—the retail customers first getting the best of it. If the whole is not thus rendered uniformly bad, a musty, ill-ventilated cellar, which it has to share with roots, fruit, meat, vegetables, etc., etc., in various stages of preservation perhaps, will speedily complete the process. Is it to be wondered at, that stuff thus cared for is a drug on the markets, and handled at a loss to all concerned? So much for the existing evils of the trade. In western Ontario the surplus for export is principally made up of "job lots" from country dealers. We notice in Liverpool, quotations for May last, that this "western Ontario" article is quoted at fifty shillings per cwt., while "eastern townships" is quoted at ninety shillings, and Danish at 125 to 127 shillings. These figures ought to be convincing as to the great necessity for improvement in this direction. When we consider what a great effect the price obtained for the exported surplus has in regulating prices to consumers at home, the loss to our Province on this product alone cannot be placed at much less than $3,000,000 annually.

To remedy such a gigantic loss is certainly a meritorious object, and well worthy the attention of our legislators, who have, or ought to have, the welfare of this country at heart; and it is gratifying to notice that the attention of our Commissioners of Agriculture is being turned to the establishment of creameries as dairy schools, for imparting a knowledge of dairying in all its branches. Although this is not the only means that should be employed, no candid and unbiased mind can fail to see in this project a very important factor in bringing about a great improvement in our butter products. The creamery system possesses the very decided advantages over the private dairies, that superior appliances, undivided attention, and superior storage, and marketing facilities cannot fail to give—not to speak of the superior skill brought to bear on every detail of the process. If a considerable proportion of our butter were manufactured in factories, and could be placed on the market at twenty-five cents per pound at the factory, as some

already established have been able to do for the entire season's make, it would raise correspondingly what would continue to be made in private dairies, and sold principally for home consumption. The great drawback hitherto, to the spread of the butter factory system amongst us, has been the great expense connected with the handling of the milk, the extra cost of appliances over cheese factories, and the supposed difficulty of disposing of the skim milk cheese in quantities at remunerative prices. Mr. Inglis, who started the Teeswater creamery, in the county of Bruce, stated to the Agricultural Commission, that that he only paid his patrons seven to eight cents per gallon for milk, and this when he was selling his butter at twenty-five cents per pound at the factory. Mr. Johnston, who runs a creamery in Blanchard township, on the Fairlamb system, and who generally obtains twenty-five cents per pound for his butter, was unable to state to the last Dairymen's Convention in Ingersoll, how much he paid his patrons per gallon of milk, but mentioned one patron who had received $30 per cow for the season. Now in these cases, although about ten cents per pound over the average price of butter was received, they fail to be as remunerative to their patrons as the ordinary run of cheese factories, which would average their patrons about ten cents per gallon during the same period. It is thus apparent that our cheesemaking districts have as yet no inducement to go extensively into butter-making; but there are many of the newer districts of our Province that might advantageously adopt the creamery system, and also a great many older districts, where stock-raising and feeding are leading features of their system of farming. The Fairlamb system would be most likely to meet the requirements of such localities, as, by this system, only the cream requires to be gathered, the skim-milk being left at the farm, where it can be best economized for feeding stock, and conserving the fertility of the farm. In the newer districts where stock is scarce, roads poor, and domestic appliances for butter-making generally very deficient, the establishment of Fairlamb creameries would be especially beneficial. The cost of collection, which would be an insuperable obstacle under the other system, would thus be reduced to a minimum, as a whole township might be rendered tributary to a single factory. The patrons would receive about as much for the cream as they would be likely to receive for the whole of the milk, after deducting the extra cost of collection, under the old system; they would have the skim milk for raising calves or pigs; and lastly, the Fairlamb cans, and cooling trough, and the instruction imparted for the care of the milk and the raising of the cream would furnish them with information, and approved appliances for producing a much superior article at home, both before and after the factory season was over.

As owing to diminished quantities and bad roads, during the early and latter parts of the milking season, butter-making is never likely to be as entirely relegated to factories as cheesemaking, the reasons adduced in favour of the Fairlamb system in the newer sections, would be almost as applicable to other localities where stock raising is the leading feature. In the older dairying regions, where the milk of from 600 to 1,000 cows could be secured within a radius of three or four miles, the older method of collecting the new milk, and setting it at the factory, or what is called the Elgin system is still most to be recommended, as a larger percentage of butter is obtained from a given quantity of milk and also slightly superior in quality,—while the skim milk, if properly manipulated, can be made into quite a marketable quality of cheese. In the States of Ohio, Indiana, and partly in Illinois, this method is found much the most remunerative. Some of the best factories there are able to obtain from thirty-five to forty cents per pound for their butter, and eight cents and upwards per pound for their skim cheese. In Iowa and other western States on the other hand, they have been unable to find a market for their skim cheese, even at prices that would pay only for the cost of making. As a consequence, the Fairlamb system is there superseding the Elgin system. Only a very limited quantity of skim cheese is yet made in Ontario, and a local market has as yet been found for it at about two or three cents less than our full milk cheese, or, say from seven to nine cents per pound. At such figures, there is a margin in favour of combined butter and skim cheese factories. It takes, on the average, about sixteen pounds of skim milk to produce one pound of pork, worth at present, say six cents live weight. The same amount of milk would produce about one and three-fifths pounds of cheese, which, at seven cents a pound, is worth say eleven cents. Allowing one cent per

pound for the extra cost of making the cheese, and another cent per pound for replacing the extra amount of mineral and nitrogenous matter carried off in the cheese, we would have value for eight cents in cheese against six cents in pork. If skim cheese only fetched six cents per pound, then, on the same basis, there would only be a value of six and two-fifths cents on cheese against six cents in pork. Hence we may safely infer that selling skim cheese at less than six cents would result in actual loss to both farm and farmer, compared with the production of pork or beef at six cents live weight. Perhaps it may be thought I am digressing; but as butter and cheesemaking are generally found most profitable combined, I have thought it necessary to adduce these approximate calculations, to show about when their combination might cease to be advantageous, and as a consequence, when the Fairlamb system might supersede with advantage the milk-gathering plan.

But whether our butter factories multiply or not, a very considerable portion of butter will always be likely to be made on the farm, and in either case the first grand requisite for improving the quality is to provide skilful makers. If the factory system is to spread, as it is every way desirable that it should, it would be a great advantage in order to have thoroughly competent factory managers, to have dairy schools, with both practical and scientific teachers, where they could be properly taught and well-grounded in all the principles underlying the art of dairying, and where they could see the finest goods manufactured, reasons given for every stage of the process, and results fully demonstrated. Two or three such schools would supply us with the requisite number of competent makers, and so improve the character of our dairy products that vast sums would be saved to the country, and amply justify the expenditure necessary for the establishment of such schools. It would not be necessary to remain long at these schools; persons of ordinary intelligence would learn all that is practically necessary in a week or two, under competent teachers. By witnessing repeatedly the practical details, the main features of the art would be indelibly fixed in their minds, and they could then with every confidence carry them into practice.

The teaching staff of these schools could be migratory for a considerable part of the dairying season. All accounts agree that this plan has accomplished much good in Ireland. There, a lecturer and dairymaid, together with all the appliances to operate with, go around from one district to another, giving their instructions and showing their methods to all in the neighbourhood who are pleased to assemble. This ocular method of imparting instruction is well calculated to attract attention, and makes a lasting impression, as no matter how clearly a process may be described, it never makes an impression like seeing it. A somewhat similar plan was also resorted to, among others, by Professor Segelcke, of Denmark. When not doing duty in the college, he would arrange to go to some dairyman's, who desired his instructions, and at whose place neighbours could convene daily to listen to his instructions, and execute all the details of the process as he directed. In the coure of two weeks one set of pupils would become experts, and no longer need his instruction, when he moved on to another place to repeat the same course.

This very practical way of imparting instruction has resulted in very satisfactory improvement among our cheesemakers. In 1879, under the directions of the Dairymen's Association of Western Ontario, Professor Arnold was sent around among the factory-men, and all in the vicinity of his stopping-place were notified in advance of his arrival, that they might be present to witness his methods and explanations as they occurred. In 1880 and 1881, Mr. J. B. Harris, of Antwerp, N. Y., followed the same course in eastern Ontario. The result was, the product became more uniformly excellent. The small amount expended for this instruction has been of vastly more benefit than all that had been previously expended for prizes at butter and cheese exhibitions.

I have still another suggestion to advance for disseminating a knowledge of the proper conditions for successful butter-making, and that is to take advantage of our Public School system for imparting instruction, in the rural districts, to the advanced classes—particularly the girls—say once a year at least, in the most approved methods of conducting all the details of the process, and contrasting these with whatever defects may prevail in the district. In this way, the rising generation could be very generally

schooled in the principles on which success depends, and in a short time they would exert a very general influence for good on the entire home production. Such technical instruction anyone qualified to have charge of a public school could prepare himself to impart by a few hours study. This would scarcely interfere with the ordinary work of the school, while it would be likely to confer very material benefit in after life on the individual pupils, and also on the community at large.

Notwithstanding the amount of technical instruction spread abroad by our agricultural press and the dairymen's associations, but little improvement seems to have resulted to the industry under discussion. The reason is, doubtless, that the larger portion of the community that is most in need of instruction fails to be reached in this way. The periodicals referred to circulate principally among the better educated classes, who are least in need of their instruction. According to statistics furnished by Professor Arnold, in the State of New York, which is better supplied with agricultural literature than any other State in the Union, there is but one agricultural paper taken for every twenty farmers. We have no definite statistics to warrant us in assuming, that in this respect we are in advance of our New York neighbours. Hence the paramount importance of adopting every other available means of educating the mass of producers to a much higher standard of technical skill, in order to bring up the quality of our productions to a much higher standard of general excellence.

The finest quality of butter is now supplied to the English market by the Danes, and they are not possessed of superior natural advantages as a dairying country to what we are possessed of. They have only the advantage of us in greater proximity to the English market. In this respect they are equalled, and in all other natural advantages they are excelled by Ireland, with its fine pastures, and equable climate, yet superior skill, and that alone enables them to place a superior product on the market. How this superior skill has been attained is worthy of our consideration, as we can undoubtedly improve our products by similar means, and remedy our defects by imitating their superior management. From an article written by Prof. Segelcke, of the Royal Agricultural College, Copenhagen, and copied from an English paper by the *National Live Stock Journal*, I take the liberty of condensing the following information in regard to the means there adopted for furthering the dairying interests:—"In the year 1836 the first effectual endeavour to improve their dairying was made. The Royal Agricultural Society of Denmark then began to pay for the technical education of young women in dairying, and continued to do so up to a few years ago, when it was no longer necessary. In 1860 Prof. Segelcke was employed by this society to occupy himself with the study of milk and its uses, and since has continued to aid in every direction the dairying interests. Within the past few years another scientific gentleman, M. Fjord, has been employed to devote his attention more particularly to the study of ice in its application to dairying. This has greatly tended to the introduction of the 'Swartz' system of butter-making. Ever since the opening of the Royal Agricultural College, in 1858, lectures have been given on dairying, and since 1874 this branch has had its own professor. By passing two or three months there, every facility is given for taking a practical share in every detail of dairying processes, and about 700 young farmers have already availed themselves of the opportunities here presented. Much practical as well as theoretical instruction is also imparted at the butter shows held every year in different parts of the kingdom. These exhibitions are generally illustrated with appropriate lectures and discussions, to which many hundreds often listen eagerly. By such means the dairying industry has been advanced from a very poor condition to its present proud place.

"Until 1860 the milk was set to cream in shallow dishes, generally of wood, ranged side by side on the floor of the milkroom, where the air was kept as pure and cool as possible. As the milk in these dishes was only about two inches deep, a great extent of floor was necessary in proportion to the quantity of milk. This method requiring much labour, and, during the summer months subject to no small difficulty, has within the last ten years been superseded by other systems which demand less labour, secure a speedier refrigeration of the milk, and thus facilitate the formation of cream. The two methods which have superseded the old system are known as the 'Orange County' and the 'Swartz' systems. According to both the milk is set for cream in deep tin cans,

immersed in water, which according to the 'Orange County' system, must be as cool as can be obtained, while according to the 'Swartz' system, the water surrounding the cans is cooled down with ice almost to the freezing point.

"The 'Orange County' system was the first adopted, but the preference is now given to the 'Swartz' system, this having gained ground rapidly within the past few years.

"Churning takes place *every day* in every dairy farm in Denmark, even in the smallest. When the churning is done the butter is taken up with a strainer, and the buttermilk worked out of it. This was formerly done with the hands, but the hand lever worker is now generally used.

"The butter is packed in wooden casks, in which it is exported, except what is destined for trans-Atlantic countries or the Mediterranean, which is before exportation repacked in tins in factories specially adapted to this branch of the trade.

"Careful records are kept of all that takes place in the dairy; not only the weight of the milk, butter, and cheese is recorded, but also the circumstances contingent on the day's work, such as the weather, the temperature, and particulars of any consequence relating to the method practiced; and by considering such facts, in connection with the quality and quantity of the produce, they are guided to successful results."

In the foregoing paragraphs we have an epitome of the means adopted by the Danes for improving the quality of their dairy products, and also of the improvements successively adopted in the butter-making process. From their experience we learn that the means already recommended for imparting technical skill were eminently successful in their case, and we may, therefore, feel assured of reaching, by the same means, as gratifying results; and we have every reason to hope in a much shorter time.

The best means for the general diffusion of a correct knowledge of dairying processes having been considered, the best methods of conducting every detal connected with the process of butter-making next claim our attention. To begin at the beginning of the process we must start with the cow. Without good, wholesome food, and pure water, she cannot elaborate pure milk for us, and without pure milk it is impossible to produce good butter. However, the cows and their feed are not in any degree responsible for the bad qualities of our butter; with the stock we have, and their present management, the best of butter can be made. It is in the subsequent management, after the milk is drawn from the cow, that the radical defects are to be found. Cleanliness in every detail is of the first importance. If this is not observed in the milking, and at every subsequent stage, a tainted product will result.

The Best Methods of Cream Separation.

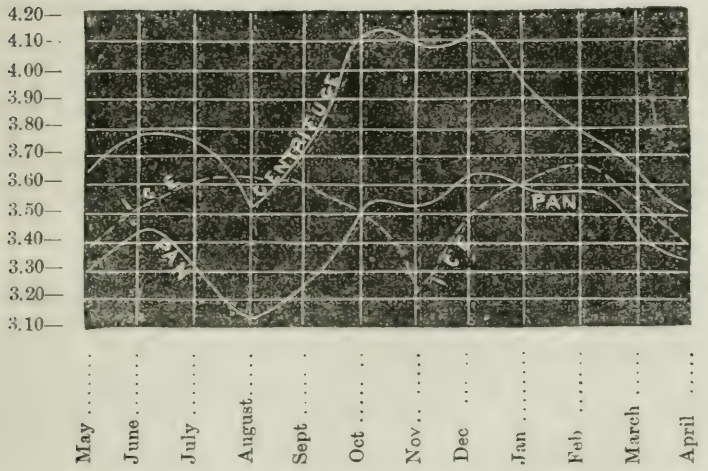
After the milking the best method of separating the cream is the next detail to discuss. The most exact experiments that I am aware of having been made, to determine the relative merits of the different methods of obtaining the most cream and butter from equal quantities of the same milk, are those of M. Fjord, the Danish gentlemen already referred to. His experiments were continued throughout the year—a number of trials being made each month. The methods investigated were the centrifuge, the ice method of Swartz, and the common shallow pan system of setting the milk.

The milk was taken from a dairy of 200 cows, and after being thoroughly mixed, 600 lbs. were weighed out for each experiment. This quantity was divided out into three parts of 200 lbs. each, one part being treated with the centrifuge, another set in ice water on the Swartz plan, the third 200 lbs. being set shallow in common flat pans. The milk which was set in ice water was placed in pails having a capacity of 50 lbs. each, the average depth being about sixteen inches, and it remained thirty-four hours in the water before skimming. The shallow pans were allowed to set about thirty-four hours; but from the end of May to the middle of September it was allowed to stand only from twenty-two to thirty hours before skimming. Although the conditions were kept as uniform as possible, there were peculiar variations under all the systems in the results, which the science of M. Fjord was unable to explain. These unaccountable variations are shown by the annexed diagram. The figures on the left hand give the quantity of

butter obtained from 100 lbs. of milk by each of the three systems, during the different months of the year.

DIAGRAM.

POUNDS OF BUTTER TO ONE HUNDRED OF MILK.



The following table gives the relative value of the three systems, in figures, for the different months of the year :—

YEAR.	Centrifuge.	Ice.	Shallow Pans.
1879.			
May	27.6	30.0	30.4
June	26.4	28.3	28.8
July	26.8	28.0	30.5
August	28.5	27.7	31.7
September	26.6	27.6	30.9
October	24.3	28.7	27.9
November	24.6	31.5	28.4
December	24.2	28.5	27.4
1880.			
January	25.8	27.8	28.0
Feburary	26.4	27.4	27.8
March	27.8	28.8	29.5
April	28.3	29.4	30.1

Referring to the diagram, it will be seen that the superiority of the centrifuge over both the ice and pan systems, is especially noticeable during October, November and December, while in August it falls below the ice method.

Swartz Method Superior to Pan Method.

The Swartz ice method proves superior to the shallow pan setting during every month of the year, except October, November and part of December, its greatest superiority being in July and August. Chemical analysis, by which these results were checked, corresponded closely to the results obtained. The average amount of fat obtained by analysis of the skim milk, out of monthly trials obtained during the year is as follows: by the centrifuge, 0·35 lbs; by ice method, 0·62 lbs; and by shallow pans, 0·68 lbs.

But the superiority of the ice over the pan system is not alone in the greater yield of butter, as it requires less labour, and produces with greater certainty a first-class product.

Creaming of Travelled Milk.

Another elaborate series of experiments of great importance to factory men was made by Fjord to determine the best conditions for cream raising with travelled milk. It was observed that milk transported to factories was more sluggish in throwing up its cream, and generally yielded less butter than when set at the farm. The agitation of the milk while being conveyed to the factory was supposed to cause this, as the milk that was transported to the greatest distance gave the poorest results. It was also observed that milk creamed with greater readiness that had not been cooled at the farm before transportation.

By the centrifuge the cream could be separated almost as well from cooled and transported milk as from samples not transported. The loss of butter by this method was only 0·7 per cent. from transported, and 1·2 from milk cooled and transported.

But for milk set for cream on the ice system, the loss of butter on the transported milk and that cooled and transported was considerably more, amounting to 4·4 and 8·8 per cent. respectively. Subsequent experiments determined that the cooling of the milk before and during the drive had more influence in arresting the creaming than the agitation of the milk, and that the longer the time the milk was cooled before and during the drive the greater was the percentage of loss from imperfect creaming, this reaching in one experiment where the milk was cooled for one hour, and then driven for three hours, as high as 29·4 per cent.

To ascertain whether the milk in this condition could be brought to yield about all its cream again, another series of experiments was made, which resulted in discovering that warming up to 104° Fahr. would overcome the resistance to creaming to a very great extent again. The example that yielded only 70·6 per cent. was brought to yield 96·8 per cent. by heating to 104° Fahr.

The important lesson for factory men to learn from this experiment is, that all milk that arrives cold at the factory, say much under 80° Fahr., should be warmed to 104° before setting. As it is essential that milk *should be cooled* at the farm, dairymen should understand, especially those who purchase the milk, than an average gain of about twelve per cent. can be saved by warming such milk before setting. But it should be understood that milk cannot be heated much, if any, above 104° without injury to the keeping qualities of the butter. From not knowing these facts very large amounts are annually lost to the butter factories.

Management of Cream for Churning.

Another point of great practical importance in butter-making is the treatment of cream preparatory to churning. It has long been considered that the proper temperature to have cream for churning should be about 60°, just a little under, or a little over in hot and cold weather respectively. Some discoveries of great importance and value to butter-

makers in the treatment of cream for churning have only recently been made known to the world. They have been brought out by the experiments of M. Fjord also. By the centrifuge experiments he noticed that when the temperature of centrifuge cream was from 58° to 60°, and was directly after cooled to the usual temperature for churning of 57½°, and then churned, the yield of butter was about seventeen per cent. less than when the cream was first cooled to 45° and under, and then heated to 57½° and churned. It was also ascertained that cream raised in a temperature under 55° made a yield of 2·3 per cent. more when the cream was cooled by ice before heating to the churning temperature. While with cream raised at a temperature of over 60°, there was a gain of over nineteen per cent. of butter by the cooling process. Hence it would be a very profitable practice in hot weather to cool centrifuge cream, or cream raised in the common way to 45°, and then raise it to the temperature for churning. This is a new and valuable discovery for butter-makers, and shows the value of scientific research in the ordinary details of the dairy. There are still many curious things about milk not yet understood, in the investigation of which the trained scientist can engage with honour to himself and benefit to the world.

Churning.

For the process of churning we have an almost endless variety of contrivances. It is an incalculable loss to civilization as well as to the pockets of millions of poor farmers that so much of the inventive genius of the age should have been devoted to churns, for after all, the old contrivance used by our great grandmothers makes as good butter as any yet invented. The old-fashioned up and down dasher, can not *easily* be hurried in the operation, and this is one good point in its favour. It can almost be warranted not to bring butter in less than the most approved period, and it is about a physical impossibility to whip the cream to death in it. Then another good point in its favour is that you can always see when the butter granulates (they should always be big enough to use without a lid), and this is just the time to add ice or cold water to reduce the temperature of the butter to about 55°. With a close box churn you may happen to churn too long before doing this, and the butter will not have as fine a grain, nor can the buttermilk be as entirely separated after. Churning should be continued very gently after chilling the butter, and only till it fairly "gathers" or granulates, when it should be separated from the buttermilk, and washed in pure cold water (some prefer brine), till the water comes off clear. It is now ready for salting and putting up for market.

Salt and Packages.

Only the best quality of salt should be used. The amount will depend on the market. For the American market one ounce to the pound is considered the right proportion, but for the English market half that quantity suits better. The salt should be worked into the butter in a uniform manner, when it should lie for about twelve hours to allow the salt to dissolve, and then should be again carefully worked over. It is now ready for the packages. If intended for exportation to the English market it suits best in Welsh tubs of a capacity of fifty-six pounds. The tubs should be made of white oak or white ash, and should be thoroughly cleansed and deodorized by soaking in brine for some time before they are used. It is important that they be smooth inside, so that the butter can be got out in nice shape. The butter should be packed down solid to within half-an-inch off the top of the tub, a clean white cloth should be put over it, and over that some salt which should be moistened just enough to make it pasty, and thus exclude the air as completely as possible. As butter never improves with age, the sooner it is sent to market the better. If the butter is intended for the home market the requirements of the trade must be conformed to in the matter of packages. It is important to please the eye as well as the palate of consumers. When the butter can be delivered fresh from the dairy to consumers, it can be most profitably disposed of if put up in attractive prints of half-a-pound or a pound each.

Practical Conclusions Deduced.

We have now considered the relative merits of the different methods of conducting the various processes in butter-making, and the disputed points that scientific investigations have succeeded in deciding. It now only remains for us to draw some practical conclusions therefrom for our guidance in improving upon prevailing practices.

The first serious defect that arrests our attention in the prevailing practice is the difficulty of controlling the temperature sufficiently to obtain anything like an approximation to successful results. Unless the temperature of the milk can be kept under 64° while the cream is rising, a very imperfect separation takes place, and so much cheesy matter adheres to the butter particles, that a white, insipid, greasy looking product is sure to result. This defect can be remedied by immersing the pans in cold water. If water at a low enough temperature, say 50° can be conveniently obtained, there will be little gained by using ice. The cabinet creamery is a very convenient contrivance for the care of milk at this time. Indeed, taking the season through, more uniformly successful results can be obtained, and with less labour by the rapid cooling system employed in these creameries, than by the common shallow pan system. We are aware that under proper conditions as fine a quality of butter can be made by the old method as by any modern innovations; but it is unwise not to discard this when the proper conditions are unattainable, as they rarely are with us during July and August.

Another radical defect, and also a very general one in the practice of our butter-makers, is keeping the cream too long before churning. Only a perceptible acidity should be allowed to develop in the cream before churning, but if this is allowed to develop to rancidity, no subsequent treatment can produce a good flavoured or long-keeping article. In this respect an imitation of Danish management would result in great improvement, for, as Prof. Sigelcke has told us, they churn every day, even in the smallest dairies. In theory, sweet cream ought to produce the longest keeping butter, but as generally made, this is not found to be the case. This is thought to be owing to the laborious process of churning sweet cream being hastened by raising the cream to such a high temperature as to render the separation of the butter more easily effected. The higher the temperature at which churning is done, the more adhesive will be the butter, and the more will the cheesy matter, which has been curdled by churning, stick to it. This renders it white in colour, and leads to rapid decay when exposed to a temperature at which changes can occur.

The Centrifuge.

We have seen that the centrifugal method effects the most thorough separation of the cream, and there can be no doubt but that the cream that is extracted by the centrifuge is the most perfect that can be obtained from milk; but until its capacity can be increased, or its cost reduced, it cannot be economically introduced into either the private dairy or the factory. It requires a steady power to run it at a uniform velocity of about 1,000 revolutions per minute, and this necessitates the use of a steam engine, which on grounds of economy could only be introduced into large dairies. Then, owing to the rapid revolution required, the capacity of the machine cannot be increased by increasing its diameter, as the increased centrifugal force would overcome the cohesion of the strongest material that could be used in its construction, and the machine would fly to pieces. As milk should be separated from cream within about four hours after milking, it will be seen that in factories of the ordinary capacity a number of them would have to be employed, as 800 pounds per hour is the utmost separating capacity of the largest yet made. On the ground of economy, then, it is found cheaper, as it is more expeditious to use ice as a separating agent in factories that receive the milk of several hundred cows.

All things considered we now come back to the conclusion that the creamery system is what is destined to work the greatest improvement in our butter products in the near future. The undivided attention of the most highly skilled practitioners, provided with the superior appliances that they can apply to every step of the process, never fails in obtaining a product of a uniformly high quality, and their superior storage and marketing

facilities enables them either to hold their goods or send to market at any time in the best possible condition. The home production will still continue to be necessary, when diminished quantities and bad roads render transporting the milk impracticable; but wherever the milk of 200 cows can be secured, within a radius of a few miles, we think the very best plan for the dairy men of the district is to establish a co-operative butter-factory.

Perhaps this paper would not be complete without an account of how to conduct a butter-factory. Not being able to do this from my own experience or observation, I cannot do better than quote the following admirable description, as contributed to the *Farmers' Advocate*, by the late lamented X. A. Willard, a short time before his death :—

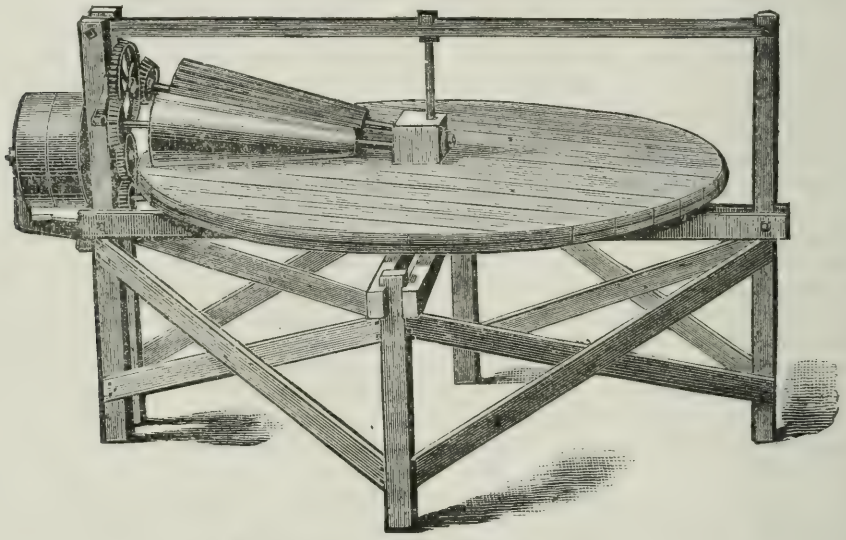
How to Make "Gilt-Edge" Creamery Butter.

"I visited a creamery a few days ago where the finest kind of butter was made, butter that is eagerly sought after, and commands an extra price in market. A description of the process may perhaps be suggestive to the butter-makers in Canada, who find it difficult to make a fine grade of butter during hot weather.

"At the creamery in question the water, though sweet and fresh, is too warm to cool the milk properly, and ice was required in its manipulation. The milk is set in a large vat, the outward appearance and size being similar to a common cheesevat. Its interior, however, was divided up in two milk compartments, the division running lengthwise of the vat. An ice trough was on the outside of each compartment, and a moveable or adjustable ice trough hung in the centre of each milk compartment. They were deep enough to extend below the cream line when the compartments are filled with milk. Ice was broken up and placed in these ice troughs, which speedily cooled the milk, and caused all the cream to rise in twelve hours. There was an arrangement by which the skimmed milk could be drawn through a faucet at the lower part of the vat. I tested the temperature of this milk as it was drawn after setting twelve hours, and it marked on the thermometer 48° Fahr. The morning's milk sets twenty-four hours, and the evening's milk twelve hours. Under this arrangement twenty-six pounds of milk, from the 'common cows of the country,' yield one pound of butter, which is considered a good average for the fore part of August. The cream is allowed to turn slightly acid before going to the churn; its temperature for churning is about 56° to 58° Fahr. When it goes into the churn one ounce of Hansen's butter colour is added to every 168 quarts of cream. The churn is the common box churn, rectangular in shape, and revolving on its smallest diameter. It has no inside fixtures, nothing but a small, smooth surface on the four sides and ends. This style of churn is popular in the west among the makers of fancy butter in Iowa, Illinois and Wisconsin, as it brings the butter in a nice granular shape, in the best condition for washing and freeing it from buttermilk. It is a very plain, simple affair, and no churn among the thousand patent devices for churning can make better butter. It may be remarked here, in passing, that the elaborate and complicated churns of the past are now discarded by the *advanced butter-maker*. He now prefers the simplest kind of arrangement, like that of the box churn, with no inside paddles or fixtures to beat the cream and injure the grain of the butter. The time consumed in churning, in the box churn, ranges from one hour to one hour and a-quarter. Just before the butter begins to granulate ice is broken up and added to the mass in the churn, and when it has fairly come in granules like shot the buttermilk is drawn, then water at a temperature of 50° Fahr. is thrown into the churn, which is revolved several times, when the water is drawn off. This process is repeated two or three times until the water comes off clear, and the buttermilk is thus expelled. The butter is now taken out and weighed in twelve and a-half pound lumps. These lumps go immediately to the butter-worker, are flattened out, and each lump is sprinkled with ten ounces of the best fine English salt. A word may be added here, in passing, that the makers of *fancy butter* are very particular as to the quality and character of salt used. It must be of the best description and from reliable and well-known brands.

"Mason's power butter-worker is used at the creamery. This is said to be *ne plus ultra* of all the butter-workers where over 400 pounds of butter are churned per day.

It has a circular and revolving table set on an incline, upon which at one point two revolving and cone-like shafts are placed. One of the rollers is fluted and the other plain. Each roller runs parallel with the table, the corrugated roller brings the butter to an even thickness, and the smooth one does the working. The table makes from twelve to eighteen revolutions per minute. Owing to the revolving table and fluted roller, there is no gliding or rubbing of the butter, and the grain is not injured. Its work is so uniform that the butter needs less working than by the ordinary methods. It is needless, perhaps, to say here that a great deal of butter is spoiled in the working, hence I have deemed it not out of place to give a brief description of a first-class butter-worker. As each salted lump of butter goes through or under the rollers it is in turn thrown up in a heap with a paddle, and then passes under the rollers again. When the lumps have been thus heaped up and passed under the rollers four times, the salt has been evenly mingled through the mass, and the butter is then taken off in tubs and placed in a cool room until next morning; it is then put upon the butter-worker and run under the rollers three or four times in the same way as at the first working; sometimes only once or twice passing under the rollers will suffice, so that it shows no streaks, but is of a uniform and even colour. The butter is then immediately packed in white oak firkins or in ash tubs that



Mason's Power Butter-Worker.

have been well soaked in brine to deodorize the wood. Care is taken to have good tight tubs, well hooped so as to allow no leakage, and to exclude as far as possible the admission of air. A clean, white muslin cloth goes on top of the tubs, and is sprinkled with salt when the cover is adjusted, and the butter is ready for market or may be stored in a cool place, say at a temperature of 50° Fahr. Such is briefly the process of manufacturing 'gilt edged' butter in one of the modern creameries of New York. And in conclusion it may be remarked that the most scrupulous cleanliness is observed and maintained in all departments of the establishment. Everything is sweet and clean, and there are no disagreeable odours floating in and about the premises to taint the milk or its product. The butter is of that delicious aroma flavour, and fine texture, that delights consumers, and for which they are willing to pay a high price."

With the exception of the rapid refrigeration of the milk, it will be seen that the process is essentially the same as in the common process that has been practised from "time immemorial" almost. Nothing better than this can be yet recommended, either for the private dairy or the butter-factory; although simple appliances may be used, the process should not differ in any respect from the foregoing.

"Submerging" Discussed.

A distinguishing feature of the Fairlamb system is the entire submerging of the cans in cold water. The advocates of this system claim that it prevents the milk from contamination by improper surroundings, and is completely protected from atmospheric influences, thus producing what they think is a perfect cream. As no provision for the escape of the "animal odour" is made—the milk being submerged as soon as possible after it is drawn from the cow—it seems to me that in flying from evil in one direction, they run into another, and frequently greater. It is opposed to all experience that contact with pure air should have an injurious influence either on the quality of cream, or the completeness of its separation, unless at a temperature of upwards of 66°. In fact the greater the surface of exposure the greater was the quantity, and the better the quality of the product. Milk set at from one and a-half to two inches, always gave better results than at a greater depth. If the action of the air is injurious why do they resort to it in the ripening of the cream? If it is not to the superior flavour of their products, why is it that butter, made on the open setting system commands the highest price? Until these questions can be satisfactorily answered, I must be excused from changing the opinion formed of the necessity of getting rid of the animal odour by open setting, in order to produce the finest flavoured goods. All the good features of the "submerging system," we think, might be retained and the "animal odour" allowed to escape, by having a conical cover on the cans, with an opening at the apex, and deeply immersing in water sufficiently cold. Then the Fairlamb system would be in every detail, the same as the other, as far as the butter-making process is considered, and no difference in quality need result.

Influence of Feed on Products.

Feed exercises a wonderful influence on the quantity of milk yielded, as well as on its quality, consequently also on the quality and quantity of its products. The percentage of cream from a given quantity of milk has been wonderfully increased by proper feed rations, as numerous careful experiments have determined. But as the feeding is not responsible for the bad quality of our butter, and as this subject alone could not be adequately discussed within the limits of a thirty-page essay, I cannot here undertake to consider it. For the sake of those who would like to produce butter of a rich yellow colour, late in the season, we may state that feeding red carrots or pumpkins in sufficient quantity, will accomplish this without resorting to annato.*

Our Marketing System and How to Improve It.

As butter rapidly deteriorates if long exposed to a temperature much over sixty degrees, it is important in marketing to keep it from being exposed to such a high temperature. Hence, at certain seasons, the necessity for shipping in refrigerator cars, as well as of securing cool storage for it when not in transit. Refrigerator rooms can also be obtained on ocean steamers; but, by having it stowed in the coolest parts, our shippers of butter find that it reaches the English market in very good condition, and the extra cost of freight in the refrigerator is thus avoided. We thus see that the wholesale trade has all necessary marketing facilities, and all that remains to suggest is to endeavour to secure better markets. Our butter-factories can, and actually do, produce in some instances at least, as fine butter as can be made anywhere else, and should be able to compete in the best markets. We know that the "West Indies is largely supplied by the Danes, and that they obtain fifty cents per pound there for their butter." There is there no hostile tariff to shut us off from such a fine market in these sister colonies. Why then cannot a "channel of trade" be opened up for our products in this direction? We are shut out by a hostile tariff from the American market, where as fine prices can

* Those desirous of further information on this subject, will find it fully discussed in the *National Live Stock Journal* for 1880, by "Alimentation."

now be obtained for really fine butter as in England ; but why cannot other channels of trade be opened up for us? If we have to be content with the English mardet for our surplus, it is at any rate satisfactory to know that it is not likely to fail us in a hurry, and that we can rely on getting our butter sold on its merits.

We cannot do this in our own markets—at least in the rural districts—owing to the channels the trade in this commodity has got into. The great bulk of our butter is produced in small lots, and as yet a considerable majority perhaps, have poor appliances for conducting dairying operations, which is generally a subordinate branch of their business. They are, therefore, under the necessity of trading it off as it is made, to the nearest storekeeper, in exchange for goods. We have already explained the evils of this system generally, so unsatisfactory to all concerned. The remedy for this is in the hands of producers, we think, through the co-operative factory system, by turning out large lots of a uniformly high quality, the best markets and marketing facilities can always be taken advantage of. But in many districts and for various reasons this may not be presently practicable. The best thing then for the dairyman to do is to procure a "cabinet creamery." This is a very useful article of furniture for every farmers' kitchen, and is not nearly so costly as a "cabinet organ." It will very soon repay the investment in the facilities it affords for producing *at all seasons* a first-class article as well as in supplying "cool storage" for the same till it is convenint to send it to market. Then having a first-class article that he can put on the market, in first-class condition, let him put on his business coat and take a sample to the city. He will have no difficulty in finding respectable grocers that will be eager to contract for all he can supply—probably at not less than twenty-five cents per pound—if he will only put it up in the attractive way customers are willing to pay for. These fancy prices his "cabinet creamery" enables him to command, will enable him to add a "cabinet organ" to his housahold furniture in due course. By reducing the drudgery of the butter-making to a minimum, his wife and daughters will secure a little more leisure for intellectual culture, that with its elevating and enobling influences would render home "the dearest spot on earth" to him and his. There are none more deserving of enjoying the fruits of their labours than those engaged in producing the "bread and butter" for our toiling millions ; and if the suggestions some rather desultory studies, at odd minutes of leisure, have enabled me here rather imperfectly to present, for improving the quality of such a staple article of diet, should result in contributing in any way to the prosperity of this great and widely diffused industry, I will always be rewarded with the thought that my labour has not been in vain.

RESULTS OF THE THIRTY-EIGHTH PROVINCIAL EXHIBITION.

The following is a statement of the amount of competition in the several classes, as compared with the four previous exhibitions :—

Horses.—The number of entries was 902, for which was paid in prizes $1,996,—against 348 entries in Kingston in 1882, for which was paid $1,211 and medals ; 749 in London in 1881, for which was paid $1,653 ; 740 in Hamilton in 1880, and 492 in Ottawa in 1879. This is the largest number of horses ever entered at any exhibition in Ontario. A new class was made for Canadian grade, Heavy Draught, and was well filled. The show of horses was very fine ; a great many were imported the present season, in Heavy Draught and Agricultural classes.

Cattle.—In all classes there were 838 entries, for which was paid in premiums $3,203 and 15 silver medals,—against in Kingston in 1882, 620 entries, to which were paid $2,982.50 in cash and 27 medals ; 656 entries in London in 1881, for which was paid $2,798, and 424 entries in Hamilton in 1880, and 618 in Ottawa in 1879 ; again showing that it was ahead of any other exhibition ever held in Ontario, both in regard to quality and numbers. Never before was so much money paid out in prizes for cattle. Each breed and class was well represented, and Holsteins were exhibited this year for the first time. The Prince of Wales' prize was, this year, given to a herd of Durham cattle.

Sheep.—868 entries—far ahead of any previous year—to which was paid in premiums $1,548 and 7 silver medals,—against 354 entries in Kingston in 1882, for which was paid $1,279 and 8 silver medals; 705 entries in London in 1881—cash paid, $1,381; 675 entries in Hamilton in 1880; 431 in Ottawa in 1879. Never was there better sheep on exhibition in Ontario.

Swine.—In all classes, 448; for which was awarded $1,027 and 5 silver medals,—against in Kingston in 1882, 343 entries, to which were paid $1,031 in prizes and 15 medals; in London in 1881, 386 entries. to which was paid $1,007; 407 entries in Hamilton in 1880, and 355 in Ottawa in 1879. The Berkshires, this year, taking the lead in numbers, with the Suffolks following very close.

Poultry.—276 entries, to which was paid $376,—against in Kingston in 1882, 321 entries, to which $345 was paid; at London in 1881, 632 entries and $321 in prizes; 821 entries in Hamilton in 1880, and 460 in Ottawa in 1879. This is the only class of live stock that did not exceed the numbers of other years. The display was good.

Agricultural Implements, Tools, Carriages and Sleighs.—581 entries; to which was awarded $647,—against 377 entries at Kingston in 1882, to which was paid $387; 615 entries at London in 1881, to which was paid $665; 370 entries at Hamilton in 1880, and 470 in Ottawa in 1879. This class always varies in size.

Agricultural Products, consisting of grain, seeds, field roots, dairy produce, sugar, bacon, wines, etc. —Total entries, in number, 1,139; for which was paid $1,269,—against at Kingston in 1882, 933 entries—premiums paid, $1,518; at London in 1881, 1,078 entries, for which was paid $1,510; at Hamilton in 1880, 1,301 entries, and at Ottawa in 1879, 1,492 entries. The entries in those classes were ahead of Kingston and London, but not up the year previous. The dairy exhibit was very good; a great deal of the success being attributed to the co-operation of the Eastern and Western Dairymen's Association, as they each made a grant to the Provincial.

Horticultural Products, consisting of fruit, flowers, and garden vegetables.—3,067 entries, for which was paid $1,305.50,—against 2,352 entries, for which was paid $1,207 and 12 bronze medals in Kingston in 1882; against 2,631 entries, for which was paid $1,510 at London in 1881; 3,999 entries in Hamilton in 1880; 2,252 in Ottawa in 1879. The show in this department was good, but was of course affected by the cold summer.

Arts and Manufactures.—The articles exhibited were arranged under the following classifications:—The *Fine Arts*, in oil paintings, water colours, crayons and pencil drawings, statuary, photography, architectural drawings, etc.; then comes Natural History and Mineralogy; the ladies' work, useful and ornamental; chemical preparations; printing and bookbinding and paper. The *Manufactures*, such as musical instruments, building materials, cabinet ware, machinery, tools, sewing machines, metal work, stoves and castings, saddlery, harness, trunks, shoe and bootmakers' work, wearing apparel, furs, woollen goods, and groceries and provisions. There were 2,117 entries, to which $1,850 was paid and 4 gold, 8 silver, and 10 bronze medals,—against 1,859 entries, in Kingston in 1882, to which were paid $1,746.50, 1 gold, 10 silver, and 12 bronze Dominion medals,—against 1,923 entries, to which was paid $2,381.50 at London in 1881; 2,571 entries at Hamilton in 1880, and 2,402 at Ottawa in 1879. This part of the show is decreasing every year.

On the whole, the thirty-eight Provincial was a grand success, and much ahead of any former one in the live stock departments, and the city of Guelph is to be congratulated in giving accommodation to so many people during the week, as well as for the erection, at a large expense, of the buildings necessary to accommodate so many animals.

For further information in regard to the competition in each class, as compared with four former exhibitions, I beg to refer to a tabulated statement subjoined, showing the amount offered in prizes, the amount awarded, and the number of entries in each class.

Financial Results.

The total amount received for members' fees, booths, stables, poultry, prize grants, licences, forage sold, and admission fees, was $13,179.45,—against $9,026 in Kingston in 1882, $20,029.26 in London in 1881, $13,960 in Hamilton in 1880, and $11,056 in Ottawa in 1879.

RESULTS of the Exhibition of 1883, showing the amount offered in Prizes, the Amount awarded, and the Number of Entries in 1883, 1882, 1881, 1880, and 1879.

CLASSES.	Amount Offered 1883.	Amount awarded 1883.	Number of Entries 1883. Guelph.	Number of Entries 1882. Kingston.	Number of Entries 1881. London.	Number of Entries 1880. Hamilton.	Number of Entries 1879. Ottawa.
	$ c.	$ c.					
Thoroughbred Horses	277 00	233 00	64	6	46	50	39
Roadster Horses	390 00	386 00	170	76	200	196	123
Carriage Horses	471 00	459 00	215	142	245	221	149
Agricultural Horses (exclusive of pure Clydesdales, Percherons and Suffolks)	381 00	360 00	215	59	149	148	122
Heavy Draught Horses (including Clydesdales and Shirebred Horses)	364 00	364 00	161	40			
Heavy Draught Horses, Grade, Canadian bred	113 00	84 00	40	.....	109	90	59
Heavy Draught Suffolk Horses	104 00	45 00	10	4			
Heavy Draught Percheron Horses	89 00	65 00	27	21			
Durham Cattle	523 00	523 00	221	137	174	134	102
Hereford Cattle	413 00	403 00	77	76	62	46	33
Devon Cattle	325 00	290 00	75	56	73	42	51
Ayrshire Cattle	416 00	416 00	111	90	104	103	194
Galloway Cattle	413 00	393 00	68	43	34	37	54
Angus or Polled Aberdeen Cattle	413 00	220 00	36	27	6	.....	.....
Jersey or Alderney Cattle	413 00	337 00	79	59	51	23	61
Holstein Cattle	90 00	90 00	24	.....	.....	.....	.....
Grade Cattle	230 00	230 00	90	52	90	29	62
Fat and Working Cattle, (any breed)	280 00	265 00	57	40	62	46	61
Cotswold Sheep	220 00	220 00	89	49	153	155	55
Leicester Sheep	232 00	242 00	190	75	184	204	137
Lincoln Sheep	235 00	235 00	114	53	143	94	54
Southdown Sheep	234 00	236 00	155	80	107	136	105
Shropshire Down Sheep	234 00	234 00	157	45	55	60	44
Hampshire and Oxfordshire Down Sheep	148 00	148 00	51				
Merino Sheep	133 00	133 00	55	32	26	.....	.....
Fat Sheep	100 00	100 00	57	20	36	26	36
Berkshire Pigs	230 00	220 00	144	93	126	131	123
Suffolk Pigs	228 00	228 00	130	115	105	141	90
Poland China Pigs	190 00	165 00	47	18	57	.....	.....
Essex Pigs	190 00	190 00	68	50	50	76	35
Yorkshire and other large breeds	238 00	224 00	59	67	48	59	107
Poultry, etc	269 00	242 00	201	226	319	417	284
Chickens, Ducks, etc., 1883. Pigeons, Rabbits	162 00	134 00	75	162	313	404	176
Agricultural Implements and Machines (for exhibition only)	.....	.....	152	96	160	141	121
Agricultural Implements	347 00	279 00	188	69	195	152	233
Carriages and Sleighs, and parts thereof	355 00	260 00	156	196	160	150	113

Agricultural Tools and Implements (chiefly for hand use)	187 00	108 00	85	16	100	77	116
Field Grains, Hops, etc.	415 00	396 00	354	324	319	381	506
Small Field Seeds, Flax, Hemp, etc.	167 00	87 00	70	90	85	113	185
Field Roots, etc	235 00	191 00	375	300	416	452	400
Dairy Products, etc.	463 00	442 00	938	155	172	257	276
Sugar, Bacon, etc.	59 00	29 00	25	10	44	45	78
Honey and Apiary Supplies	49 00	43 60	42	21			
Domestic Wines	90 00	64 00	35	33	42	62	47
Fruit (Professional Nurserymen's List)	200 00	123 00	36	35	61	80	76
Fruit—General List—(Apples and Pears)	383 00	366 00	1460	1306	1283	1985	843
Fruit—General List, *Continued*—(Plums, Peaches, Grapes, etc.)	433 00	360 00	815	437	432	943	550
Garden Vegetables	184 00	165 00	500	436	543	611	475
Plants and Flowers	347 00	291 50	256	138	312	380	308
Fine Arts (Oils)	255 00	229 00	188	131	185	191	162
Fine Arts (in Water-colours, Crayons, etc.)	270 00	173 00	234	237	288	361	319
Penmanship, Linear Drawing, Photography, Engraving. etc..)	233 00	80 00	46	50	69	75	119
Natural History and Mineralogy	274 00	131 00	53	40	45	54	86
Ladies' Work (Ornamental)	233 60	217 00	532	512	311	443	628
Ladies' Work (Useful)	134 50	126 00	340	285	261	216	416
Chemical Manufactures and Preparations	92 00	47 00	30	12	36	39	78
Printing, Bookbinding, Paper, etc.					20	33	28
Musical Instruments			23	30	45	19	6
Building Materials, Painting, Work in Marble, etc.	204 00	39 00	20	15	33	50	61
Cabinet-ware and other Wood and Hair Manufactures	307 00	85 00	70	86	84	86	100
Machinery and parts thereof, and Tools	753 00	157 00	100	50	97	135	194
Sewing Machines (for exhibition only)			60	15	31	48	24
Mechanical Metal Work (Miscellaneous)	304 00	91 00	75	50	66	73	92
Stoves and Castings	194 00	116 00	67	50	89	159	152
Saddle, Harness and Trunkmakers' Work, Engine, Hose, etc.	216 00	102 00	33	30	26	50	54
Shoe and Bootmakers' Work and Material	179 00		10	32	32	41	72
Wearing Apparel and Furs, Flax, Hemp and Cotton Goods	230 00	51 00	34	75	36	71	76
Woollen Goods	355 00	162 00	162	95	103	139	190
Groceries and Provisions	204 00	44 00	30	55	66	72	128
Essays	200 00	200 00	19	9	11		
Dominion Special Prize for cow of any breed for milking purposes				11			
Prince of Wales' Annual Special Prize for herd of Durham Cattle	60 00	60 00	5	2			
Farmers' Advocate Annual Prize for Fall, Winter, and Spring Wheat	100 00	100 00	48	4			
Extra Animals			2	23			
Stone & Wellington's Special Prize for best sample of Pocklington Grapes.	100 00	100 00	4				
Medals (for Exhibition)	835 00	1055 00					
Medals (for Prize Farms)	100 00	100 00					
Totals	18494 50	14819 50	10315	7916	9486	11252	9668

COMPARATIVE TABLE, showing the Progress of the Provincial Exhibition since its commencement in 1846.

Year.	PLACES OF EXHIBITION.	Total amount offered in Prizes.	Total number of entries.	Total amount awarded.
		$ c.		$ c.
1846..	Toronto	1600 00	1150	1100 00
1847..	Hamilton	3000 00	1600	2400 00
1848..	Cobourg	3100 00	1500	2300 00
1849..	Kingston	5600 00	1429	2800 00
1850..	Niagara	6106 00	1638	3400 00
1851..	Brockville	5017 85	1466	3223 75
1852..	Toronto	5916 95	4048	4913 00
1853..	Hamilton	6410 15	2820	5293 25
1854..	London	7176 10	2933	5427 50
1855..	Cobourg	9216 30	3077	6941 70
1856..	Kingston	9238 00	3791	6799 50
1857..	Brantford	10071 40	4337	8136 00
1858..	Toronto	10700 50	5572	9215 00
1859..	Kingston	10513 00	4830	8067 50
1860..	Hamilton	15015 50	7532	12900 00
1861..	London	12031 00	6242	10188 00
1862..	Toronto	12236 00	6319	10722 00
1863..	Kingston	11866 00	4756	9166 00
1864..	Hamilton	12559 50	6392	10304 25
1865..	London	13434 00	7221	11036 75
1866..	Toronto	12712 00	6279	10288 50
1867..	Kingston	12731 00	4825	9311 50
1868..	Hamilton	13304 50	6620	11120 00
1869..	London	13428 00	7649	11459 50
1870..	Toronto	14110 00	6847	12441 70
1871..	Kingston	15724 50	6682	12951 00
1872..	Hamilton	16092 00	7714	13142 00
1873..	London	16016 00	8420	13797 00
1874..	Toronto	16640 00	8162	14070 00
1875..	Ottawa	16996 50	7318	14651 00
1876..	Hamilton	18237 00	10011	15631 50
1877..	London	16320 60	10618	14387 00
1878..	Toronto	17947 40	10292	13980 00
1879..	Ottawa	18525 00	9668	14957 50
1880..	Hamilton	16994 00	11252	13147 50
1881..	London	17154 50	9486	13456 50
1882..	Kingston	19927 00	7916	14912 00
1883..	Guelph	18494 50	10315	14819 50

OFFICIAL LIST OF PRIZES AWARDED AT THE THIRTY-EIGHTH PROVINCIAL EXHIBITION OF THE AGRICULTURE AND ARTS ASSOCIATION OF ONTARIO, HELD AT GUELPH, FROM SEPTEMBER 24TH TO 29TH, 1883.

HORSES.

64 ENTRIES.

JUDGES.—James Daniels, L'Orignal; Miles Storms, Colebrook; James Sutton, M.D., McGillivray.

CLASS I.

THOROUGHBRED STALLION, 4 YEARS OLD AND UPWARDS.

First Prize, $30. Second Prize, $24. Third Prize, $14.

1st Prize, James Anderson, V. S., Galt, Ont., "Terror," 17 years old, bred by J. & J. White, Bronte: sire, Ruric; dam, Maritana (imp).
2nd do Wm. Hendrie, Hamilton, Ont., "Big Sandy;" sire, Australian (imp.); dam, Gennevar by Lexington.
3rd do John T. Hicks, Esq., Mitchell.

THOROUGHBRED STALLION, 3 YEARS OLD.

First Prize, $20. Second Prize, $10.

1st Prize, B. McQuillan, Guelph, Ont., "Prince Arthur."
2nd do I. N. Hall, Ingersoll, Ont., "Nobby Milesian Good Enough;" sire, Old Milesian; dam, Nobby.

THOROUGHBRED STALLION, 2 YEARS OLD.

First Prize, $10.

James McKerlie, Nelson, Ont., "Orlo," dark bay; sire, Terror; dam, Lady Buford.

THOROUGHBRED YEARLING COLT.

First Prize, $10. Second Prize, $6.

1st Prize, John White, Milton, Ont.
2nd do John Clark, Alloa, Ont.

THOROUGHBRED STALLION, ANY AGE.

Prize, Diploma.

Jas. Anderson, V.S., Galt, "Terror."

THOROUGHBRED 3-YEAR-OLD FILLY.

First Prize, $16. Second Prize, $10.

1st Prize, John White, Milton.
2nd do John Dyment, Orkney, Ont., "Aunt Alice;" sire, Terror; dam, Ada.

THOROUGHBRED 2-YEAR-OLD FILLY.

First Prize, $12.

John Dyment, Orkney, "Lucy Lightfoot;" sire, Big Sandy; dam, Nettie.

THOROUGHBRED YEARLING FILLY.

First Prize, $8. Second Prize, $6.

1st Prize, John White, Milton.
2nd do John Dyment, Orkney, "Maggie May;" sire, Big Sandy; dam, Nettie.

THOROUGHBRED BROOD MARE, WITH FOAL BY HER SIDE.

First Prize, $20. Second Prize, $12. Third Prize, $7.

1st Prize, John White, Milton.
2nd do John White, Milton.
3rd do Jas. McKerlie, Nelson.

THOROUGHBRED FEMALE ANY AGE.

Prize, Diploma.

John White, Milton.

THOROUGHBRED FOAL OF 1883.

First Prize, $8. Second Prize, $6.

1st Prize, John White, Milton.
2nd do John White, Milton.

CLASS II.

ROADSTER HORSES, FOR DRIVING OR THE SADDLE.—170 ENTRIES.

JUDGES.—J. B. Hughes, Waterloo; James Cross, Cassburn; Charles O'Neal, Paris.

ROADSTER STALLION, 4 YEARS OLD AND UPWARDS.

First Prize, $35. Second Prize, $25. Third Prize, $15.

1st Prize, McMillan Bros., Erin.
2nd do J. J. McLaughlin, Clinton, "Sorel Cloud."
3rd do Aaron Abbott, Everton.

ROADSTER STALLION, 3 YEARS OLD.

1st Prize, $20. Second Prize, $15. Third Prize, $10.

1st Prize, J. & J. Hainer, Georgetown.
2nd do Levi A. Toole, Bowmanville.
3rd do Geo. Coghlan, Eramosa.

ROADSTER STALLION, 2 YEARS OLD.

First Prize, $20. Second Prize, $12. Third Prize, $6.

1st Prize, Maurice O'Connor, Guelph.
2nd do P. P. Barrett, Hespeler.
3rd do Joseph Backer, Cranbrook, "Clear Grit."

ROADSTER YEARLING COLT.

First Prize, $10. Second Prize, $7.

1st Prize, William Hendrie, jr., Hamilton.
2nd do Adam M. Van Sickle, Jerseyville.

ROADSTER STALLION, ANY AGE.

Prize, Diploma.

McMillan Bros., Erin.

ROADSTER FILLY OR GELDING, 3 YEARS OLD.

1st Prize, $16. Second Prize, $10. Third Prize, $6.

1st Prize, Charles Head, Guelph.
2nd do John McConnell, Guelph.
3rd do R. M. Wilson, Delhi.

ROADSTER FILLY OR GELDING, 2 YEARS OLD.

First Prize, $12. Second Prize, $8. Third Prize, $5.

1st Prize, James Slemmon, Winfield.
2nd do James Harrison, Georgetown.
3rd do Nelson Standish, Georgetown.

ROADSTER YEARLING FILLY OR GELDING.

First Prize, $8. Second Prize, $6. Third Prize, $4.

1st Prize, Geo. S. Armstrong, Fergus.
2nd do J. & R. McQueen, Salem.
3rd do Nelson Standish, Georgetown.

ROADSTER BROOD MARE, WITH FOAL BY HER SIDE.

First Prize, $20. Second Prize, $12. Third Prize, $6.

1st Prize, Abraham Van Sickle, Jerseyville.
2nd do Matthew Howson, Ashgrove.
3rd do William Johnston, Galt.

ROADSTER FOAL OF 1883.

First Prize, $8. Second Prize, $6. Third Prize, $4.

1st Prize, William A. Bescoby, Georgetown.
2nd do Matthew Howson, Ashgrove.
3rd do Abram M. Van Sickle, Jerseyville.

PAIR ROADSTER MATCHED HORSES, IN HARNESS (Stallion excluded).

First Prize, $20. Second Prize, $15. Third Prize, $10.

1st Prize, James Matthew, Acton.
2nd do A. W. Green, Acton.
3rd do John Wideman, Yatton.

ROADSTER SINGLE HORSE, IN HARNESS (Stallion excluded).

First Prize, $15. Second Prize, $12. Third Prize, $8.

1st Prize, Thomas Gowdy, Guelph.
2nd do C. E. Rymal, Hamilton.
3rd do Fred Wm. Stone, Guelph.

CLASS III.

CARRIAGE HORSES.—ANIMALS 3 YEARS OLD AND UPWARDS, TO BE OVER 15½ HANDS.—215 ENTRIES.

JUDGES.—A. R. McGregor, Sarnia; Ira F. Gulp, Beamsville; Joseph Kilgour, Mount Forest.

CARRIAGE STALLION, 4 YEARS OLD AND UPWARDS.

First Prize, $35. Second Prize, $25. Third Prize, $15.

1st Prize, Hartley & Ellis, Zimmerman.
2nd do James Irving, Cass Bridge.
3rd do James Drinkwater, Alloa, "Goldleaf."

CARRIAGE STALLION, 3 YEARS OLD.

First Prize, $20. Second Prize, $15. Third Prize, $10.

1st Prize, George Whitely, Seaforth.
2nd do Steven Farrell, Arthur.
3rd do D. McDiarmid, Mohawk.

CARRIAGE STALLION, 2 YEARS OLD.

First Prize, $20. Second Prize, $12. Third Prize, $6.

1st Prize, John Hayes, Hamilton.
2nd do W. C. Brown, Meadowvale.
3rd do Owen Robertson, Manswood.

CARRIAGE YEARLING COLT.

First Prize, $10. Second Prize, $7.

1st Prize, Matthew Howson, Ashgrove.
2nd do D. McDiarmid, Mohawk.

CARRIAGE STALLION, ANY AGE.

Prize, Diploma.

George Whitely, Seaforth.

CARRIAGE FILLY OR GELDING, 3 YEARS OLD.

First Prize, $16. Second Prize, $10. Third Prize, $6.

1st Prize, Hartley and Ellis, Zimmerman.
2nd do J. W. Bessey, Georgetown.
3rd do James Starkey, Arkell.

CARRIAGE FILLY OR GELDING, 2 YEARS OLD.

First Prize, $12. Second Prize, $7. Third Prize, $4.

1st Prize, William Scott, Barnett.
2nd do Hugh Black, Rockwood.
3rd do Walter Laing, Guelph.

CARRIAGE YEARLING FILLY OR GELDING.

First Prize, $8. Second Prize, $6. Third Prize, $4.

1st Prize, John Orr, Galt.
2nd do J. and R. Hunter, Alma.
3rd do Matthew Howson, Ashgrove.

CARRIAGE BROOD MARE, WITH FOAL BY HER SIDE.

First Prize, $20. Second Prize, $12. Third Prize, $6.

1st Prize, W. C. Brown, Meadowvale.
2nd do Matthew Howson, Ashgrove.
3rd do J. W. Bessey, Georgetown.

CARRIAGE FOAL OF 1883.

First Prize, $8. Second Prize, $6. Third Prize, $4.

1st Prize, W. C. Brown, Meadowvale,
2nd do Matthew Howson, Ashgrove.
3rd do W. J. Thompson, Orkney.

PAIR MATCHED CARRIAGE HORSES, IN HARNESS.—(Stallions excluded.)

First Prize, $20. Second Prize, $15. Third Prize, $10.

1st Prize, J. C. Shannon, Waterford.
2nd do A. D. McPherson, Glenmorris.
3rd do Guggisberg Bros. & Co., Preston.

PAIR MATCHED CARRIAGE HORSES (Under 15½ hands, in harness. Stallions excluded).

First Prize, $15. Second Prize, $12. Third Prize, $8.

1st Prize, R. M. Wilson, Delhi.
2nd do Philip Miller, Port Rowan.
3rd do J. W. Bessey, Georgetown.

SINGLE CARRIAGE HORSE, IN HARNESS (Stallion excluded).

First Prize, $15. Second Prize, $12. Third Prize, $8.

1st Prize, J. B. Armstrong, Guelph.
2nd do J. C. Morrow, Fergus.
3rd do R. Shannon, Brantford.

SADDLE HORSE (Not over 16 hands. Stallion excluded).

First Prize, $15. Second Prize, $12. Third Prize, $8.

1st Prize, R. Shannon, Brantford.
2nd do F. B. DeChadenides, Guelph.
3rd do T. C. Greenside, Guelph.

LADY RIDERS.

Prize, Silver Medal and $5.

Miss Laing, Guelph.

HUNTER, IN SADDLE, OVER HURDLES.

First Prize, Silver Medal. Second Prize, Bronze Medal.

1st Prize, George S. Armstrong, Fergus.
2nd do Walter Laing, Guelph.

CLASS IV.

HORSES FOR AGRICULTURAL PURPOSES (Exclusive of Pure Clydesdales, Percherons and Suffolks).
215 ENTRIES.

JUDGES.—Charles Sealey, Waterdown ; John Ross, Cookstown ; James Dempster, Gananoque.

AGRICULTURAL STALLION, 4 YEARS OLD AND UPWARDS.

First Prize, $35. Second Prize, $25. Third Prize, $15.

1st Prize, William Sadler, Galt, "St. Elmo."
2nd do Frederick Shertzberg, Brantford.
3rd do John Patterson, Port Hope.

AGRICULTURAL STALLION, 3 YEARS OLD.

First Prize, $20. Second Prize, $12.

1st Prize, Joseph Ricker, Sheffield.
2nd do Richard Paddock, Kildean.

AGRICULTURAL STALLION, 2 YEARS OLD.

First Prize, $20. Second Prize, $12. Third Prize, $6.

1st Prize, George Vance, Ratho.
2nd do George Vance, Ratho.
3rd do Joseph Button, Thistletown, "Tom of Etobicoke."

AGRICULTURAL YEARLING COLT.

First Prize, $10. Second Prize, $7. Third Prize, $4.

1st Prize, John Watson, Winfield.
2nd do Richard Paddock, Kildean.
3rd do John Stewart, Cromarty.

AGRICULTURAL STALLION, ANY AGE.

Prize, Diploma.

William Sadler, Galt, "St. Elmo."

AGRICULTURAL FILLY OR GELDING, 3 YEARS OLD.

First Prize, $16. Second Prize, $10. Third Prize, $6.

1st Prize, Neil Smith, Woodhill.
2nd do William Shafen, Berlin.

AGRICULTURAL FILLY OR GELDING, 2 YEARS OLD.

First Prize, $12. Second Prize, $8. Third Prize, $4.

1st Prize, Josiah Oliver, Derry West.
2nd do Frederick Shertzberg, Brantford.
3rd do Thomas Marshall, Galt.

AGRICULTURAL YEARLING, FILLY OR GELDING.

First Prize, $8. Second Prize, $6. Third Prize, $4.

1st Prize, Jacob Bricker, Roseville.
2nd do T. Chisholm, Manswood.
3rd do John Clark, Alloa.

AGRICULTURAL BROOD MARE, WITH FOAL BY HER SIDE.

First Prize, $20. Second Prize, $12. Third Prize, $6.

1st Prize, Andrew Aitchison, Inverhaugh.
2nd do Henry Dunbar, Ospringe.
3rd do M. Kirby, Armstrong's Mills.

AGRICULUTURAL FOAL OF 1883.

First Prize, $8. Second Prize, $6. Third Prize, $4.

1st Prize, Andrew Aitchison, Inverhaugh.
2nd do William N. Scott, Milton.
3rd do M. Kirby, Armstrong's Mills.

MATCHED FARM TEAM, IN HARNESS (Stallions excluded).

First Prize, $20. Second Prize, $15. Third Prize, $10.

1st Prize, W. J. Dickson, Walton.
2nd do Andrew Turnbull, Galt.
3rd do Alexander McPhail, Galt.

BEST PAIR MATCHED HORSES, GENERAL PURPOSES.

Special Prize by Empire Horse and Cattle Food Co., Mitchell, $15.

Andrew Turnbull, Galt.

CLASS V.

HEAVY DRAUGHT HORSES, IMPORTED OR BRED FROM PURE IMPORTED HEAVY DRAUGHT STOCK ON THE SIDE OF BOTH SIRE AND DAM, INCLUDING CLYDESDALES AND SHIREBRED HORSES.—161 ENTRIES.

JUDGES.—Arthur Johnston, Greenwood; T. L. Pardo, Buckhorn; Thomas Blezard, Norwood.

HEAVY DRAUGHT STALLION, 4 YEARS OLD AND UPWARDS.

First Prize, $40. Second Prize, $25. Third Prize, $15.

1st Prize, James Storey, Markham, "Silent James," (imp.) Shirehorse.
2nd do H. & R. Beith, Bowmanville, "British Commander" (1981), brown, three white feet; bred by R. D. B. Cunningham, New Galloway, Scotland; sire, General Neil (1143); dam, Esmeralda (710).
3rd do Brooks & Colquhoun, Mitchell, "Glengarry" [18], (imp.), brown, white face and hind feet, bred by George Marr, Cairnbogie, Scotland; sire, Farmer's Glory (see Appendix, vol. I., S.S.B.); dam, Jess, by Glengarry (1444).

HEAVY DRAUGHT STALLION, 3 YEARS OLD.

First Prize, $20. Second Prize, $15. Third Prize, $10.

1st Prize, J. & P. Brooks, Blanchard, "John A." (2182), bright bay; foaled April 20, 1880; bred by James Ross, Titwood, Dunlop, Ayrshire, Scotland; sire, Young Lord Lyon (994); dam, Jean of Titwood (367).
2nd do The Sydenham and St. Vincent Stock Importing Co., Meaford, "Oak Branch" (2638), dapple bay, imported in 1882 by Mr. John Palmer, Richmond Hill.
3rd do John Duff, Everton, (imp.), "Davie Lad" (2051), dark brown, bred by William Craig, Renfrewshire, Scotland; sire, Young Lord Lyon (994): dam, Jess (1144).

HEAVY DRAUGHT STALLION, 2 YEARS OLD.

First Prize, $20. Second Prize, $12. Third Prize, $6.

1st Prize, Simon Beattie, Annan, Scotland, imported this season a Clyde.
2nd do Horton & Innes, Clinton, "Pride of Avon" (2329), imported bay; foaled May, 1881; bred by James Vallance, Lanarkshire, Scotland; sire, Cedric (1087); dam, Jean (1818).
3rd do John McMullan, Constance, "Puzzler" (imp.): sire, Ploughboy (590); dam, Bess, by Old Times (578).

HEAVY DRAUGHT YEARLING COLT.

First Prize, $10. Second Prize, $7. Third Prize, $4.

1st Prize, Mr. Davis, Windsor, imported by Simon Beattie, of Annan, Scotland.
2nd do Horton & Innes, Clinton, "Kinmount Willie" (imported); dam Bell (1335).
3rd do Alexander Forsythe, Brucefield.

HEAVY DRAUGHT STALLION, ANY AGE.

Prize, Diploma.

James Storey, Markham, "Silent James," Shirehorse; imported.

HEAVY DRAUGHT FILLY, 3 YEARS OLD.

First Prize, $16. Second Prize, $10. Third Prize, $6.

1st Prize, Gernon White, Dumbarton, "Wee Beauty."
2nd do Thos. McCrae, Guelph, "Modesty" [12] (imp.), bay, with two white feet, foaled June, 1880; bred by Thos. Wilkin, Dumfries, Scotland; sire, Chancellor of Blackhall (1094); dam, Darling, (1840).
3rd do William Colquhoun, Mitchell, "Lady Montgomery" (imported); (vol. 6), brown, white face, feet and legs, foaled 1880; bred by Matthew Dunlop, Tannoch, Scotland; sire, Royal George (731), dam, Dunlop Mare, (vol. 6).

HEAVY DRAUGHT FILLY, 3 YEARS OLD.

First Prize, $12. Second Prize, $8. Third Prize, $4.

1st Prize, Robt. Young, Galt; imported in 1882, (in vol. 6, S. C. S. B.)
2nd do Thomas McCrae, Guelph, "Heather Bell" [10] (imp.), brown, cream mane and tail, and white hind feet, foaled 16th May, 1881; bred by James McQueen, Dalbeattie, Scotland; sire, Young Pride of Scotland (1368); dam, Nanny of Crofts (859.)
3rd do Simon Beattie, Annan, Scotland; imported this season.

HEAVY DRAUGHT YEARLING FILLY.

First Prize, $8. Second Prize, $6. Third Prize, $4.

1st Prize, John Dryden, M.P.P., Brooklin, "Lady Clare" (vol. 5).
2nd do J. A. Watson, Eden Mills, Clarinda" [14] "Bright Ray," foaled 12th April, 1882; bred by James Picken, Laigh Langride Craigie, Scotland; sire, Glenlee (363); dam, Clara (1642.)
3rd do Thomas McCrae, Guelph, "Glenkin's Princess" [7] (imp.), brown, foaled 5th May, 1882; bred by Captain R. De Barre Cunninghame, Castle Douglas, Scotland; sire, Sir Michael (1530); dam, Esmeralda (730).

THREE HEAVY DRAUGHT FEMALES, ANY AGE.

Prize, Diploma.

Jno. McMillan, Constance.

HEAVY DRAUGHT BROOD MARE, WITH FOAL BY HER SIDE.

First Prize, $20. Second Prize, $15. Third Prize, $8.

1st Prize, Mr. Davis, Windsor, imported by Simon Beattie, Annan Scotland.
2nd do Humphrey Snell & Son, Clinton, "Bessie Lea."
3rd do Joseph Skinner, Mitchell.

HEAVY DRAUGHT FOAL OF 1883.

First Prize, $8. Second Prize, $6. Third Prize, $4.

1st Prize, Joseph Skinner, Mitchell.
2nd do Hendrie & Douglass, Hamilton.
3rd do Humphrey Snell & Son, Clinton.

SPAN OF HEAVY DRAUGHT HORSES, IN HARNESS (Stallions excluded.)

First Prize, $20. Second Prize, $15. Third Prize, $10.

1st Prize, Wm. Boyd, Toronto.
2nd do John McMillian, Constance.
3rd do Thos. McCrae, Guelph, "Nelly Bly" [6] and "Prince" of Kelvie [13].

CLASS VI.

HEAVY DRAUGHT HORSES. Grade—(Canadian Bred.)—40 ENTRIES.

JUDGES.—Same as in preceding class.

HEAVY DRAUGHT BROOD MARE, WITH FOAL BY HER SIDE. Grade—(Canadian Breed,)

First Prize, $15. Third Prize, $5.

1st Prize, George A. Wallace, Ponsonby.
3rd do John Taylor, Rockwood.

HEAVY DRAUGHT FILLY, 3 YEARS OLD. Grade—(Canadian Bred).

First Prize, $12.

Joseph Hagen, Eden Mills.

HEAVY DRAUGHT FILLY, 2 YEARS OLD. Grade—(Canadian Bred).

First Prize, $10. Second Prize, $6. Third Prize, $4.

1st Prize, James Tabb, Auburn.
2nd do Jonh McMillian, Constance.
3rd do Andrew Harvie, Kirkwall.

HEAVY DRAUGHT YEARLING FILLY. Grade—(Canadian Bred).

First Prize, $8. Second Prize, $6. Third Prize, $4.

1st Prize, Andrew Clarke, Orangeville.
2nd do Alex. Stinson, Glen Allan.
3rd do Jacob Ricker, Roseville.

HEAVY DRAUGHT FOAL OF 1883. Grade—(Canadian Bred).

First Prize, $8. Second Prize, $6.

1st Prize, George A. Wallace, Ponsonby.
2nd do John Taylor, Rockwood.

CLASS VII.

SUFFOLKS, HEAVY DRAUGHT HORSES IMPORTED OR BRED FROM PURE IMPORTED HEAVY DRAUGHT STOCK ON THE SIDE OF BOTH SIRE AND DAM.—10 ENTRIES.

JUDGES.—Same as for Class V.

SUFFOLK STALLION, 3 YEARS OLD AND UPWARDS.

First Prize, $20. Second Prize, $10.

1st Prize, William Sadler, Galt, "Young Hero."
2nd do Fred. Wm. Stone, Guelph.

SUFFOLK STALLION, ANY AGE

Prize, Diploma.

William Sadler, Galt, "Young Hero."

CLASS VIII.

PERCHERONS, HEAVY DRAUGHT HORSES, IMPORTED OR BRED FROM PURE IMPORTED DRAUGHT STOCK ON THE SIDE OF BOTH SIRE AND DAM.—27 ENTRIES.

JUDGES.—Charles Sealey, Waterdown; James Dempster, Gananoque; John Ross, Cookstown.

PERCHERON STALLION, 3 YEARS OLD AND UPWARDS.

First Prize, $20. Second Prize, $10.

1st Prize, T. & A. B. Snider, German Mills.
2nd do do do do

PERCHERON STALLION, 2 YEARS OLD.

First Prize, $10.

1st Prize, T. & A. B. Snider, German Mills.

PERCHERON STALLION, ANY AGE.

Prize, Diploma.

T. & A. B. Snider, German Mills,

PERCHERON FEMALE, ANY AGE.

First Prize, $15. Second Prize, $10.

1st Prize, T. & A. B. Snider, German Mills.
2nd do Maurice O'Connor, Guelph.

SPECIAL.—BEST PAIR OF WALKING HORSES FOR THE ROAD OR FARM.

First Prize, Silver Medal. Second Prize, Bronze Medal.

1st Prize, W. J. Dickson, Walton.
2nd do Alex. McPhail, Galt.

SPECIAL PRIZE, OFFERED BY WM. SADLER, GALT, FOR COLT OF 1883, SIRED BY "ST. ELMO."

First Prize, $10.

1st Prize, John Phin, Hespeler.

SPECIAL PRIZE, OFFERED BY WM. SADLER, GALT, FOR COLT OF 1883, SIRED BY "YOUNG HERO."

First Prize, $10. Second Prize, $5.

1st Prize, John Bruce, Galt.
2nd do Patrick Kinsella, Hespeler.

CATTLE.

CLASS IX.

DURHAMS.—221 ENTRIES.

JUDGES.—James I. Davidson, Balsam; Henry Collins, Peterborough; A. Rawlings, Forest.

DURHAM BULL, 3 YEARS OLD AND UPWARDS.

First Prize, $40. Second Prize, $25. Third Prize, $15.

1st Prize, J. & W. Watt, Salem, "Barmpton Hero" [6595], roan, calved May 22nd, 1878; bred by John Dryden, M.P.P., Brooklin; got by Royal Barmpton [3969] (32996); dam, Mimules, by Champion of England (17526), etc.
2nd do Rowland & Scott, Dunblane, "British Prince" [8174], red and white; calved October 26th, 1879; bred by John S. Armstrong, Speedside; got by 2nd Prince of Springwood, [5978]; dam, English Lady II., by Prince Royal [3871].
3rd do J. & R. McQueen, Salem, "Duke of Athol" [4962], red and white; calved October 30th, 1876; bred by Mr. William Douglas, Seneca, got by Lord Languish [3527] 17559; dam, Mirtle, by Lothair [1718] 10393.

DURHAM BULL, 2 YEARS OLD.

First Prize, $40. Second Prize, $25. Third Prize, $15.

1st Prize, Green Brothers, Oakville, "Earl of Marr" (imp.), rich roan, calved May 2nd, 1881; bred by Wm. S. Marr, Upper Mill, Scotland; got by Bentinck (42787); dam, Emma II., by Golden Eagle (26267), etc.
2nd do John Fothergill, Burlington, "Prince James" [10329], roan, calved December 23rd, 1880; bred by J. and R. Hunter, Alma; got by Knight of Warlaby [1634] (29014): dam, Queen of the May V., by Baron Booth of Kilerby [4271], etc.
3rd do John Currie, Everton "Culloden" [8292], red; calved November 28th, 1880; bred by W. T. O'Connor, Guelph; got by Prince Charlie [7639]; dam, Florence, by Clarendon [2491], etc.

DURHAM YEARLING BULL.

First Prize, $35. Second Prize, $20. Third Prize, $12.

1st Prize, John Dryden, M.P.P., Brooklin, "Lord Glamis."
2nd do Grant and Campbell, Woodville, "Macduff" [10200], red, calved September 23rd, 1881; bred by J. & W. Watt, Salem; got by Barmpton Hero [6595]; dam, Princess Macula II. by Oxford Prince [1925], etc.
3rd do Alexander McPhail, Galt, "British Flag."

DURHAM BULL CALF, UNDER 1 YEAR.

First Prize, $20. Second Prize, $15. Third Prize, $10.

1st Prize, J. & W. Watt, Salem, "Challenge."
2nd do J. & W. Watt, Salem, "Marquis of Lansdowne."
3rd do J. & R. Hunter, Alma, "Red Jacket."

DURHAM BULL ANY AGE.

Prize, Silver Medal.

J. & W. Watt, Salem, "Barmpton Hero" [6595], roan, calved May 22nd, 1878; bred by John Dryden, M.P.P., Brooklin; got by Royal Barmpton [3969] (32995); dam, Minnules, by Champion of England (17526), etc.

DURHAM COW.

First Prize, $30. Second Prize, $20. Third Prize, $15.

1st Prize, J. & W. Watt, Salem, "Crimson Flower 2nd," red, calved April 29th, 1874, bred by Birrell and Johnston, Greenwood; got by Scotsman II.; dam, Crimson Flower (imp.), by Refiner (24928).
2nd do J. & W. Watt, Salem, "Lady Russell," red and very little white, calved April 12th, 1878; bred by Arthur Johnston, Greenwood; got by Scotsman III.; dam, Dora, by Highland Chief 6864.
3rd do J. & R. McQueen, Salem, "Agatha" (vol. 4, C. S. H. H. B., p. 3), red and white, calved Nov. 1876; bred 29th, by exhibitors; got by Juno's Mazurka [5444]; dam, Annie Elizabeth, by Conrad [1143] 5478.

DURHAM COW, THREE YEARS OLD.

First Prize, $30. Second Prize, $20. Third Prize, $15.

1st Prize, T. & A. B. Snider, German Mills, "Rose of Strathallan 2nd."
2nd do J. & W. Watt, Salem, "Rose of Fairview" (vol. 6, C. H. B., p. 542), red and white, calved December 10th, 1879; bred by Malcolm McTaggart, Clinton; got by Baron Louan III. [4589]: dam, Maggie Hill (vol. 3, p. 606), by 6th Grand Duke of Moreton [1499].
3rd do J. & W. Watt, Salem, "Scarlet Velvet."

DURHAM HEIFER, TWO YEARS OLD.

First Prize, $20. Second Prize, $15. Third Prize, $10.

1st Prize, J. & W. Watt, Salem, "Violet's Lancaster."
2nd do T. & A. B. Snider, German Mills, "Gean Blossom" (imp.).
3rd do J. & W. Watt, Salem, "Rose of the Valley."

DURHAM YEARLING HEIFER.

First Prize, $16. Second Prize, $12. Third Prize, $8.

1st Prize, J. & W. Watt, Salem, "Stamford XI."
2nd do J. & W. Watt, Salem, "Rosa Lee," red, calved December 24, 1881; bred by exhibitors; got by Barmpton Hero [6595]; dam, Rose II. by Baron Booth of Killerby [4271].
3rd do T. & A. B. Snider, German Mills, "Rose of Strathallan 3rd."

DURHAM HEIFER CALF, UNDER 1 YEAR.

First Prize, $15. Second Prize, $10. Third Prize, $5.

1st Prize, J. & W. Watt, Salem, "Hesper."
2nd do John S. Armstrong, Speedside, "Geraldine II.," roan, calved September 19th, 1882; bred by exhibitor; got by Butterfly Duke; dam, Mary Ann X., by Heir of Englishman (24122).
3rd do J. & R. Hunter, Alma, "Queen of the May VII."; got by Socrates [10520] (45640), dam, Queen of the May III. by Knight of Warlaby [1634] (29014).

DURHAM, FEMALE, ANY AGE.

Special Prize by Empire Horse and Cattle Food Co., Mitchell, $10.

T. & A. B. Snider, German Mills, "Rose of Strathallan 2nd."

FOUR CALVES, UNDER 1 YEAR (Owned by Exhibitor, and sired by same Bull).

Prize, Diploma.

J. & W. Watt, Salem, "Challenge" "Hesper," "Prince Albert," and "Kossuth."

HERD OF DURHAM CATTLE, CONSISTING OF ONE BULL AND FOUR FEMALES, OF ANY AGE, OWNED BY EXHIBITOR.

Special—Prince of Wales' Prize, $60.

J. & W. Watt, Salem, "Barmpton Hero" [6595], "Lady Russell," "Rose of Fairview," "Violet's Lancaster," and "Stamford XI."

CLASS X.

HEREFORDS.—77 ENTRIES.

JUDGES.—C. Barker, Paris: Thomas Clark, Ottawa; John Sharp, Bath.

HEREFORD BULL, 3 YEARS OLD AND UPWARDS.

First Prize, $35. Second Prize, $25. Third Prize, $10.

1st Prize, Fred. Wm. Stone, Guelph, "Duke of Manchester" (5308).
2nd do Fred. Wm. Stone, Guelph, "Quebec" (6125).
3rd do F. A. Fleming, Weston, "Corporal" (imp.) [38], calved June 18, 1880; bred by Mr. Thomas Myddleton, Shropshire, England; sire, Captain (5238); dam, Violet IV., by Young Sir Thomas (3624).

HEREFORD BULL, 2 YEARS OLD.

First Prize, $30. Second Prize, $20. Third Prize, $10.

1st Prize, C. C. Bridges, Shanty Bay, "Serjeant" [109] (imp.), calved June 1st, 1881; bred by Thomas Myddleton, Acton-on-Clun, England; got by Captain (5238); dam, Miss Nobleman V., by Bafon IV. (4326).
2nd do Fred. Wm. Stone, Guelph, "Bonny Lad IV." (6317).
3rd do Fred. Wm. Stone, Guelph, "Picture V." (6600).

HEREFORD BULL, 1 YEAR OLD.

First Prize, $25. Second Prize, $15. Third Prize, $8.

1st Prize, Fred. Wm. Stone, Guelph, "Victor VII." (7333).
2nd do Fred. Wm. Stone, Guelph, "Wilfred."
3rd do Fred. Wm. Stone, Guelph, "Bonnie Lad VII."

HEREFORD BULL CALF, UNDER 1 YEAR.

First Prize, $15. Second Prize, $10. Third Prize, $5.

1st Prize, Fred. Wm. Stone, Guelph, "Bonnie Lad IX."
2nd do Fred. Wm. Stone, Guelph, "Grandee VIII."
3rd do C. C. Bridges, Shanty Bay, "Merryman" [105], calved October 30th, 1882; bred by exhibitor; got by Corporal [38] (imp.); dam, Merry III. [37], by Archduke (4312).

HEREFORD BULL, ANY AGE.

Prize, Silver Medal.

Fred. Wm. Stone, Guelph, "Duke of Manchester" (5308).

HEREFORD COW.

First Prize, $25. Second Prize, $15. Third Prize, $10.

1st Prize, Fred. Wm. Stone, Guelph, "Vesta IX."
2nd do Fred. Wm. Stone, Guelph, "Lady Winnifred."
3rd do C. C. Bridges, Shanty Bay, "Merry III." (imp.) [37], calved March 4th, 1879; bred by E. Grasett, Welmore, England; got by Archduke (4312); dam, Cherry XVIII., by Renown (2719).

HEREFORD COW, 3 YEARS OLD.

First Prize, $25. Second Prize, $15. Third Prize, $10.

1st Prize, Fred. Wm. Stone, Guelph, "Graceful 22nd."
2nd do Fred. Wm. Stone, Guelph, "Graceful 33rd."
3rd do Fred. Wm. Stone, Guelph, "Peach 11th."

HEREFORD HEIFER, 2 YEARS OLD.

First Prize, $20. Second Prize, $12. Third Prize, $8.

1st Prize, Fred. Wm. Stone, Guelph, "Graceful 27th."
2nd do Fred. Wm. Stone, Guelph, "Graceful 26th."
3rd do C. C. Bridges, Shanty Bay, "Greenslieve 4th" [91], (imp.), calved May 23rd, 1881; bred by E. Grasett, Craven Arms, Eng.; got by Commander (4453); dam, Greenslieve 2nd, by Vanquisher (5102).

HEREFORD HEIFER, 1 YEAR OLD.

First Prize, $15. Second Prize, 10. Third Prize, $5.

1st Prize, Fred. Wm. Stone, Guelph, "Graceful 30th."
2nd do C. C. Bridges, Shanty Bay, "Little Annie" (imp.), [97], calved Jan. 17th, 1882; bred by Thomas Myddleton, Acton-on-Clun, Eng.; got by Regulus (4076); dam, Miss Annie II. [97], by Hartington (5358).
3rd do Fred. Wm. Stone, Guelph, "Sweetheart 17th."

HEREFORD HEIFER CALF, UNDER 1 YEAR.

First Prize, $12. Second Prize, $8. Third Prize, 5.

1st Prize, Fred. Wm. Stone, Guelph, "Cherry 11th."
2nd do Fred. Wm. Stone, Guelph, "Peach 11th."
3rd do Fred. Wm. Stone, Guelph, "Graceful 33rd."

HERD OF HEREFORDS, CONSISTING OF ONE BULL AND FOUR FEMALES, ANY AGE OR AGES.

Prize, Silver Medal.

Fred. Wm. Stone, Guelph.

CLASS XI.

DEVONS.—75 ENTRIES.

JUDGES.—Joseph Walker, Niagara; Wm. Lang, St. Mary's; Thos. Haut, Woodslee.

DEVON BULL, 3 YEARS OLD AND UPWARDS.

First Prize, $30. Second Prize, $20.

1st Prize, G. & A. Wood, Islington, "The Marquis" [773], calved Oct. 29th, 1878; bred by George Rudd, Guelph; sire, Prince Albert Victor; bred by Her Majesty; dam, Lady Eliza [655], by Hartland [363].

2nd do William Courtice, Courtice, "John A," [842], calved March, 1880; bred by exhibitor; sire, Jack's Alive [749]; dam, Plumb [792], by King William [417].

DEVON BULL, 2 YEARS OLD.

First Prize, $20.

S. & M. Rudd, Guelph, "Napoleon" [868], calved November 7th, 1881; bred by George Rudd; sire, King of the Ocean [727]; dam, Lady Eliza [655] by Hartland [363].

DEVON BULL, 1 YEAR OLD.

First Prize, $20. Second Prize, $15.

1st Prize, S. & M. Rudd, Guelph "Defeater," [867], calved March 28th, 1882; bred by George Rudd; sire, The Marquis [773]; dam, Red Rose [777], by Hartland [363].

2nd do John Hawes & Son, Marden, "Professor" [847], calved November 20th, 1882; bred by John Hawes, Marden; sire, King of the Ocean [727]; dam, Thrifty [608] by Monarch [604].

DEVON BULL CALF, UNDER 1 YEAR.

First Prize, $15. Second Prize, $10.

1st Prize, John Hawes & Son, Marden, "Jumbo" [882], calved January 1st, 1883; bred by exhibitors; sire, The Marquis [773]; dam, Blossom [751] by Dandy [670].

2nd do S. & M. Rudd, Guelph, "Hartland III." [866], calved November 20th, 1882; bred by George Rudd; sire, Oxford Lad [804]; dam, Lady Eliza [655] by Hartland [363].

DEVON BULL, ANY AGE.

Prize, Silver Medal.

G. & A. Wood, Islington, "The Marquis" [773].

DEVON COW.

First Prize, $20. Second Prize, $15. Third Prize, $10.

1st Prize, William Courtice, Courtice, "Plumb" [792], calved March 3rd, 1876; bred by exhibitor; sire, King William [417]; dam, Queen II. [788] by Gladstone [391].

2nd do G. & A. Wood, Islington, "Maggie May" [769], calved March 12th, 1879; bred by Richard Morgan, Islington; sire, Royal George [718]; dam Mossy [681] by Hartland [363].

3rd do John Hawes & Son, Marden, "Blossom" [751], calved September 15th, 1877; bred by George Rudd; sire Dandy [670]; dam, Miss Ann [582] by Hartland [363].

DEVON COW, 3 YEARS OLD.

First Prize, $20. Second Prize, $15. Third Prize, $10.

1st Prize, G. & A. Wood, Islington, "Buttercup" [815], calved January 11th, 1880; bred by Samuel Wood, Islington; sire, Kilpatrick [745]; dam, Lady of the Lake [709], by Dandy [670].

2nd do S. & M. Rudd, Guelph, "Miss Butterfly" [797], calved April 15th, 1880; bred by George Rudd; sire, Prince Albert Victor; dam, Lady Eliza [655] by Hartland [363].

3rd do William Courtice, Courtice "Susan" [793], calved March 17th, 1879; bred by exhibitor; sire, Samson II. [789]; dam, Queen II. [788] by Gladstone [391].

DEVON HEIFER, 2 YEARS OLD.

First Prize, $15. Second Prize, $10.

1st Prize, G. & A. Wood, Islington, "Olivette" [846], calved March 2nd, 1881; bred by exhibitors; sire, Royal George [718]; dam, Moss Rose [711] by Hartland [363].

2nd do S. & M. Rudd, Guelph, "Lady Eulalie" [869], calved August 1st, 1881; bred by George Rudd, Guelph; sire, The Marquis [773]; dam, Curly [342] by Samson VI. [310].

DEVON HEIFER, 1 YEAR OLD.

First Prize, $12. Second Prize, $8.

1st Prize, G. & A. Wood, Islington, "Dominion Beauty" [844], calved Feb. 1st, 1882; bred by exhibitors; sire, Lord Lorne [816]; dam, Betsy [710] by Hartland [363].

2nd do G. & A. Wood, Islington, "Lady Lorne" [845], calved May 10th, 1882; bred by exhibitors; sire, Lord Lorne [816]; dam, Moss Rose [711] by Hartland [363].

DEVON HEIFER CALF, UNDER 1 YEAR.

First Prize, $10. Second Prize, $5.

1st Prize, S. & M. Rudd, Guelph.
2nd do John Hawes & Son, Marden, "Snow Drop" [883].

SPECIAL PRIZE.—DEVON FEMALE, ANY AGE.

(By Empire Horse and Cattle Food Co.), $10.

John Hawes & Son, Marden.

HERD OF DEVONS, CONSISTING OF ONE BULL AND FOUR FEMALES, ANY AGE OR AGES.

Prize, Silver Medal.

G. & A. Wood, Islington.

CLASS XII.

AYRSHIRES.—111 ENTRIES.

JUDGES.—R. D. Fulton, Chesterville; T. C. Stark, Gananoque; Thomas Turner, Eden Grove.

AYRSHIRE BULL, 3 YEARS OLD AND UPWARDS.

First Prize, $35. Second Prize, $25. Third Prize, $10.

1st Prize, James McCormick, Rockton, "Frank" [1330], white and brown, calved April 20th, 1880; bred by Thomas Guy, Oshawa; sire, Prince Charley [1273]; dam, Oshawa Belle [777], by Bismarck [500].
2nd do T. Guy & Son, Oshawa, "Wm Wallace" [1247], dark red and white, calved September 10th, 1879; bred by Jardine & Son; sire, Mars I. [803], 2177; dam, Heather Bell [678], by Wilson [438].
3rd do James McNish & Son, Lyn, "Colonel II." [1402], brown and little white, calved October 12th, 1879; bred by Andrew Allan, Montreal: sire, Colonel [1010]; dam, Blossom II. [1250], by Sir George III. 427.

AYRSHIRE BULL, 2 YEARS OLD.

First Prize, $30. Second Prize, $20. Third Prize, $10.

1st Prize, Samuel J. Lyons, Norval, "Eureka" [1349].
2nd do T. Guy & Son, Oshawa, "Sir Garnett" [1408], white, spotted with red, calved September 10th, 1881; sire, Wm. Wallace [1247]; dam, Maggie [1310], by Canada [919].
3rd do T. Guy & Son, Oshawa, "Robert Bruce" [1447], red and white, calved August 22nd, 1881; bred by John Lawrie, Malvern; sire, Rob Roy [1254]; dam, Wild Flower [466], by Avondale Farmer [116], 422.

AYRSHIRE BULL, 1 YEAR OLD.

First Prize, $25. Second Prize, $15. Third Prize, $8.

1st Prize, T. Guy & Son, Oshawa, "Scottish Chief" [1446], brown with white spots, calved July 20th, 1882; bred by exhibitors; sire, Sultan [1288]; dam, Pansy II. [1378], by Royal Butterfly [1274].
2nd do E. W. Ware, Hamilton, "Garfield" [1361], red and white, calved Feburary 6th, 1882; bred by E. W. Ware, Hamilton; sire, Mars I. [803], 2177; dam, Pansy [1136], by Warrior [780].
3rd do William C. Beaty, Omagh, (imp. in dam) "Conqueror II." [1472], dark red and white, calved October 20th, 1881; bred by J. B. Bessey & Bro., Georgetown; sire, Conqueror in Scotland; dam, Heather Bloom (imp.) [1599], by General, in Scotland.

AYRSHIRE BULL CALF, UNDER 1 YEAR.

First Prize, $15. Second Prize, $10. Third Prize, $8.

1st Prize, Wm. C. Beaty, Omagh, "Prince of Ashdale" [1473], red and white; calved March, 1883; bred by exhibitor; sire, Sir Colin [1259]; dam, May Queen [772] by Bismarck [500].
2nd do T. Guy & Son, Oshawa, "Victor."
3rd do James McCormick, Rockton, "Tecumseh" [1480], red and white, calved May 20th, 1883; bred by exhibitor; sire, Frank [1330].

AYRSHIRE BULL, ANY AGE.

Prize, Silver Medal.

T. Guy & Son, Oshawa, "Scottish Chief" [1446], brown with white spots, calved July 20th, 1882; bred by exhibitors; sire, Sultan [1288]; dam, Pansy II, [1378], by Royal Butterfly [1274].

AYRSHIRE COW.

First Prize, $25. Second Prize, $15. Third Prize, $10.

1st Prize, T. Guy & Son, Oshawa, "Gurta IV." [1181], red and white, calved January 6th, 1878; bred by Thomas Guy; sire, Cyrus [601]; dam, Gurta [64] 1244, by Prince of Wales [17], (135).
2nd do John Gildner, Berlin, "Perfection" [1005], red and white. calved January 27th, 1877; sire, Rocket [602]; dam, Oxford Beauty [853], by Grand Duke [250] etc.
3rd do E. W. Ware, Hamilton, "Pansy" [1136], red and white, calved May 16th, 1878; bred by Mr. John Foott, Port Hope; sire, Warrior [750]; dam, Charlotte 137 [709], by Carrick Farmer, (imp.) [48] 1947, etc.

AYRSHIRE COW, 3 YEARS OLD.

First Prize, $25. Second Prize, $15. Third Prize, $10.

1st Prize, E. W. Ware, Hamilton, "Daisy" [1400], red and white, calved September 28th, 1879; bred by George Thomson, Bright; sire, Arthur Mars [983]; dam, Oshawa Lass [515] by Burns [513].
2nd do John Gildner, Berlin, "Beauty 5th" [1368], red and white, calved March 6th, 1881, sire, Lord Raglan [1221]; dam, Oxford Beauty [853], by Grand Duke [250] etc.
3rd do John Gildner, Berlin, "Nell 2nd" [1327], red and white, calved December 3rd, 1879; sire, Rocket [602]; dam, Little Nell [855] by Spot [127] etc.

AYRSHIRE HEIFER, 2 YEARS OLD.

First Prize, $20. Second Prize, $12. Third Prize, $8.

1st Prize, Wm. C. Beaty, Omagh, "Daisy II." (imp.) [1531], red and white, calved December, 1880; bred by James Weir, Sandelands, Lanark, Scotland; sire, Chester Hall; dam, Daisy of Sandelands (imported), (955).
2nd do T. Guy & Son, Oshawa, "Model III." [1381], red and white (twin), calved September 5th, 1880; bred by exhibitors; sire, Royal Butterfly [1274]; dam, Model [1179] by Bismarck [500].
3rd do John Gildner, Berlin, "Beauty 4th" [1326], red and white, calved January 25th, 1880; bred by A. Park, Es., Hollin; sire, Rocket [602]; dam, Oxford Beauty [853] by Grand Duke [250] etc.

AYRSHIRE HEIFER, 1 YEAR OLD.

First Prize, $15. Second Prize, $10. Third Prize, $5.

1st Prize, T. Guy & Son, Oshawa, "Gurta VI." [1506], brown and white, calved September 5th, 1881; bred by exhibitors; sire William Wallace [1247]; dam, Gurta IV. [1181] by Cyrus [601].
2nd do J. B. Drury, Listowel, "Beauty VI." [1560], red and white, calved December 1st, 1881; bred by Arch. Park, Hollin; sire, Lord Raglan [1221]; dam, Beauty III. [1325], by Rocket [602].
3rd do John Gildner, Berlin, "Tidy" [1619], red and white, calved May 20th; 1882; sire, Cadno, [1237]; dam, Nell 2nd [1327] by Rocket [602], etc.

AYRSHIRE HEIFER, UNDER 1 YEAR.

First Prize, $12. Second Prize, $8. Third Prize, $5.

1st Prize, T. Guy & Son, Oshawa, "Empress" [1550].
2nd do do do do "Gurta VII."
3rd do do do do "Heifer" out of White Tulip [278].

SPECIAL—AYRSHIRE, FEMALE, ANY AGE.

(By Empire Horse and Cattle Food Co.), $10.

T. Guy & Son, Oshawa, "Gurta IV." [1181], red and white, calved Jan. 6th, 1878; bred by Thomas Guy; sire, Cyrus [601], dam, Gurta [64], 1244, by Prince of Wales [17], (135).

HERD OF AYRSHIRES, CONSISTING OF ONE BULL AND FOUR FEMALES, ANY AGE OR AGES.

Prize, Silver Medal.

T. Guy & Son, Oshawa.

CLASS XIII.

GALLOWAYS.—68 ENTRIES.

JUDGES.—James Fleming, Grahamsville; James Fisher, Hyde Park; John H. Carnegie, Peterborough.

GALLOWAY BULL, 3 YEARS OLD AND UPWARDS.

First Prize, $35. Second Prize, $25.

1st Prize, Thomas McCrae, Guelph, "Elrig" [551], (imp.), calved April 10th, 1881; bred by Mr. William Routledge, Scotland; sire, The Baron of Drumlanrig (1158); dam, Maggie II. of Elrig (3030), etc.
2nd do Thomas McCrae, Guelph, "Lochiel" [591], (imp.), calved May 6th, 1881; bred by George Greig, Esq., Galloway, Scotland; sire, Maori Chief [592], 1433; dam, Lilias of Milnmark (3503).

GALLOWAY BULL, 2 YEARS OLD.

First Prize, $30 Second Prize, $20. Third Prize, $10.

1st Prize, Thomas McCrae, Guelph, "Macleod II. of Drumlanrig" [553], (1676), calved March 5th, 1881; bred by Duke of Buccleuch, Scotland; sire, Stanley of Drumlanrig (1348), dam, Harriet IV. of Drumlanrig (2622), etc.
2nd do N. Higginbottom, Guelph, "Mochrum" [554], (imp.), calved February 22nd, 1881; bred by Mr. Routledge, Scotland; sire. The Baron of Drumlanrig (1158); dam, Mary II. of Elrig (2705)
3rd do Thomas McCrae, Guelph, "Autumn" [549], (1698), (imp.), calved April 21st, 1881; bred by W. & T. Shennon, Scotland; sire, Normandy (1533); dam, Miller VI. (3449).

GALLOWAY BULL, 1 YEAR OLD.

First Prize, $25. Second Prize, $15. Third Prize, $8.

1st Prize, Thomas McCrae, Guelph, "Arabi Bey" [548], calved April 21st, 1882; bred by A. Milligan, Scotland; sire, Macleod of Taberoch (1471); dam, Nellie of Cornwall (3888), etc.
2nd do Thomas McCrae, Guelph, "Chapelton" [550], calved June 16th, 1882; bred by Mr. S. Moffatt, Scotland; sire, Dick of Walton (2195); dam, Maid of Dumfries [513], (4974).
3rd do Thomas McCrae, Guelph, "Creochs" [675], calved January 2nd, 1883, got in Scotland; bred by exhibitor; sire, Forest Chief (1855); dam, Careful [559], etc.

GALLOWAY BULL CALF, UNDER 1 YEAR.

First Prize, $15. Second Prize, $10. Third Prize, $5.

1st Prize, Thomas McCrae, Guelph, "Bruce" [665], calved May 3rd, 1883; bred by exhibitor; sire, Young Franklin [595]; dam, Young Cherry [609].
2nd do Thomas McCrae, Guelph, "Hawarden" [668], calved January 12th, 1883; got in Scotland; sire, Harden (1151); dam, Lucetta (3441), etc.
3rd do Thomas McCrae, Guelph, "Closeburn" [666], calved January 28th, 1883; got in Scotland; sire, Prince Victor (1473); dam, Beauty II. of Troquhain [556], etc.

GALLOWAY BULL, ANY AGE.

Prize, Silver Medal.

Thomas McCrae, Guelph, "Macleod II. of Drumlanrig" [553], (1676), calved March 5th, 1881; bred by Duke of Buccleuch, Scotlond; sire, Stanley of Drumlanrig [1348]; dam, Harriet IV. of Drumlanrig (2622), etc.

GALLOWAY COW.

First Prize, $25. Second Prize, $15. Third Prize, $10.

1st Prize, Thomas McCrae, Guelph, "Lucetta" [569], calved October 6th, 1882; bred by Mr. Thomas Fisher, Scotland; sire, Islesman (1590); dam, Belted Lass [557], etc.
2nd do Thomas McCrae, Guelph, "Jenny of Tarbreoch" [567], calved March, 1879; bred by William Shennan, Scotland; sire, Sousy John (1238); dam, Jenny II. of Barmoffily (3114), etc.
3rd do Thomas McCrae, Guelph, "Meg of Congeith" [574], calved March 28th, 1879; bred by Mr. John Cannon, Scotland; sire, Lofty (1085); dam, Maggie of Congeith (3086), etc.

GALLOWAY COW, 3 YEARS OLD.

First Prize, $25. Second Prize, $15. Third Prize, $10.

1st Prize, Thomas McCrae, Guelph, "Topsy of Tarbreoch" [582] (imp.), calved March 25th, 1880; bred by Earl of Galloway, Garliestown, Scotland; sire, Scottish Borderer (669); dam, Topsy of Garliestown (2843).
2nd do Thomas McCrae, Guelph, "Blossom of Tarbreoch" [558] (imp.), calved February 28th, 1880; bred by Earl of Galloway, Garliestown, Scotland; sire, Scottish Borderer (669); dam, Blossom of Garliestown (2846).
3rd do Thomas McCrae, Guelph, "Miss Hope II. of Balgray" [575] (imp.), calved February 13th, 1880; bred by J. Jardine Paterson, Balgray, Scotland; sire, Olden Times (1369); dam, Miss Hope of Balgray (3077) by Bob of Balgray (1092).

GALLOWAY HEIFER, 2 YEARS OLD.

First Prize, $20. Second Prize, $12. Third Prize, $8.

1st Prize, Thomas McCrae, Guelph, "Lucetta II." [570] (imp.), calved January, 1881; bred by James Cunningham, Tarbreoch, Scotland: sire, Knowsley (1279); dam, Lucetta [569] (3441), by Scottish Borderer (669).
2nd do William Hearn, Guelph, "Empress" [517], calved December 9th, 1880; bred by Jos. Hickson, Montreal; sire, Laird of Burleigh [516]; dam, Black Swan [328], by Lord Wellington [332].
3rd do Thomas McCrae, Guelph, "Nancy of Tarbreoch" [580] (imp.), calved January, 1881; bred by James Cunningham, Scotland; sire, Knowsley (1279); dam, Mary V. of Tarbreoch (3435), by Chieftain of Drumlanrig (752).

GALLOWAY HEIFER, 1 YEAR OLD.

First Prize, $15. Second Prize, $10. Third Prize, $5.

1st Prize, Thomas McCrae, Guelph, "Cherry Blossom" [602] (imp.), calved 1882; bred by Robert Wallace, Kirkcudbright, Scotland; sire, Scotia of Tarbreoch [594]; dam, Cherry of Hensol [603] (3554), by the Major of Hensol (1299).
2nd do Thomas McCrae, Guelph, "Nellie" [608], calved April, 1882; bred by James McLean, Annan, Scotland; sire, Maori Chief [592] (1433); dam, a pure bred Galloway cow, from Lord Galloway's stock.
3rd do Thomas McCrae, Guelph, [610] "Nettie" (imp.), calved May, 1882; bred by James McLean, Annan, Scotland; sire, Maori Chief [592] (1433); dam, a pure bred Galloway cow, from Lord Galloway's stock.

GALLOWAY HEIFER CALF, UNDER 1 YEAR.

First Prize, $12. Second Prize, $8. Third Prize, $5.

1st Prize, Thomas McCrae, Guelph, "Fairy Dell" (imp.) [690], calved January 29th, 1883; bred in Scotland; sire, Macleod of Tarbreoch (1471); dam, Nellie of Cornwall [581], by Dominie Samson (1149).

2nd Prize Thomas McCrae, Guelph, "Lady Geills" [568] (imp.), calved October 6th, 1882; bred by Thos. Fisher, Craignorget, Scotland; sire, Islesman (1590); dam, Belted Lass [557] by Craignorget [511].
3rd do Thomas McCrae, Guelph, "Maggie Lauder" (imp.) [692]; bred in Scotland; sire, Bob of Congeith (1719); dam, Meg of Congeith [574], by Lofty (1085).

HERD OF GALLOWAYS, CONSISTING OF ONE BULL AND FOUR FEMALES, ANY AGE OR AGES.

Prize, Silver Medal.

Thomas McCrae, Guelph.

CLASS XIV.

ANGUS OR POLLED ABERDEENS.—36 ENTRIES.

JUDGES.—Same as for Galloways.

ANGUS OR POLLED ABERDEEN BULL, 1 YEAR OLD.

First Prize, $25. Second Prize, $15. Third Prize, $8.

1st Prize, Geary Bros., London, "Lord of the Forth."
2nd do do do
3rd do do do

ANGUS OR POLLED ABERDEEN BULL CALF, UNDER 1 YEAR.

First Prize, $15.

Geary Bros., London, "Laird of Blibro."

ANGUS OR POLLED ABERDEEN BULL, ANY AGE.

Prize, Silver Medal.

Geary Bros., London.

ANGUS OR POLLED ABERDEEN COW.

First Prize, $25. Second Prize, $15.

1st Prize, Geary Bros., London, "Agnes of Westside" (4260).
2nd do do do "Maud of Guisachan" (4404).

ANGUS OR POLEED ABERDEEN COW, 3 YEARS OLD.

First Prize, $25. Second Prize, $15.

1st Prize, Geary Bros., London, "Julia of Ythsie."
2nd do do do "Nelly 3rd" (5037).

ANGUS OR POLLED ABERDEEN HEIFER, 2 YEARS OLD.

First Prize, $20. Second Prize, $12.

1st Prize, Geary Bros., London.
2nd do do do

ANGUS OR POLLED ABERDEEN HEIFER, 1 YEAR OLD.

First Prize, $15. Second Prize, $10.

1st Prize, Geary Bros., London, "Favourite of Alteare V." (5586).
2nd do do do "Cootie."

ANGUS OR POLLED ABERDEEN HEIFER CALF, UNDER 1 YEAR.

First Prize, $12. Second Prize, $8.

1st Prize, Geary Bros., London, "Mary of Blibro."
2nd do do do "Carena."

HERD OF ANGUS OR POLLED ABERDEENS, CONSISTING OF ONE BULL AND FOUR FEMALES, ANY AGE OR AGES.

Prize, Silver Medal.

Geary Bros., London.

CLASS XV.

JERSEY OR ALDERNEY CATTLE.—79 ENTRIES.

JUDGES.—F. K. Moreland, Ogdensburg, N.Y.; David Duncan, Don; H. J. LeFevre, Lakefield.

JERSEY OR ALDERNEY BULL, 3 YEARS OLD AND UPWARDS.

First Prize, $35. Second Prize, $25. Third Prize, $10.

1st Prize, Valancey E. Fuller, Hamilton, "Thalma," 4288 A.J.C.C.
2nd do Mrs. E. M. Jones, Brockville, "Rival" (imp.), 3762.
3rd do Mrs. E. M. Jones, Brockville, "Wandefair," 8216.

JERSEY OR ALDERNEY BULL, 2 YEARS OLD.

First Prize, $30. Second Prize, $20.

1st Prize, T. Guy & Son, Oshawa, "Boulivot," imported by Simon Beattie in 1881.
2nd do Harold Sorby, Gourock.

JERSEY OR ALDERNEY BULL, 1 YEAR OLD.

First Prize, $25. Second Prize, $15. Third Prize, $8.

1st Prize, Mrs. E. M. Jones, Brockville, "Florist," 8622.
2nd do H. L. Ross, Georgetown, "Hanlan" [5].
3rd do Valancey E. Fuller, Hamilton, "Canada's John Bull," 8388 J.C.C.

JERSEY OR ALDERNEY BULL CALF, UNDER 1 YEAR.

First Prize, $15. Second Prize, $10. Third Prize, $5.

1st Prize, Mrs. E. M. Jones, Brockville, "Mistletoe's Rival," 5857.
2nd do Harold Sorby, Gourock.
3rd do H. L. Ross, Georgetown, "Eureka."

JERSEY OR ALDERNEY BULL, ANY AGE.

Prize, Silver Medal.

Mrs. E. M. Jones, Brockville, "Florist," 8622 A.J.C.C.

JERSEY OR ALDERNEY COW.

First Prize, $25. Second Prize, $15. Third Prize, $10.

1st Prize, Valancey E. Fuller, Hamilton, "Faith of Oakland," 19696 J.C.C.
2nd do Mrs. E. M. Jones, Brockville, "Mistletoe," 5857.
3rd do Valancey E. Fuller, Hamilton, "Epegia," 4631 J.C.C.

JERSEY OR ALDERNEY COW, 3 YEARS OLD.

First Prize, $25. Second Prize, $15.

1st Prize, Mrs. E. M. Jones, Brockville, "Canada Caroline," 2019.
2nd do Mrs. E. M. Jones, Brockville, "Maggie Bradley," 1055.

JERSEY OR ALDERNEY HEIFER, 2 YEARS OLD.

First Prize, $20.

H. L. Ross, Georgetown.

JERSEY OR ALDERNEY HEIFER, 1 YEAR OLD.

First Prize, $15. Second Prize, $10. Third Prize, $5.

1st Prize, Valancey E. Fuller, Hamilton, "Easter Star," 20145 A.J.C.C.
2nd do Mrs. E. M. Jones, Brockville, "Rival's Favourite," 4645.
3rd do Mrs. E. M. Jones, Brockville, "Rival's Eugenie," 1623.

JERSEY OR ALDERNEY HEIFER CALF, UNDER 1 YEAR.

First Prize, $12. Second Prize, $8. Third Prize, $5.

1st Prize, Mrs. E. M. Jones, Brockville, "Rival's Patience."
2nd do Mrs. E. M. Jones, Brockville, "Florist's Caroline."
3rd do Mrs. E. M. Jones, Brockville, "Signalexa."

SPECIAL—FEMALE, ANY AGE.

Prize (by Empire Horse and Cattle Food Co.), $10.

Valancey E. Fuller, Hamilton, "Faith of Oakland," 19696 A.J.C.C.

HERD OF JERSEY OR ALDERNEY CATTLE, CONSISTING OF ONE BULL AND FOUR FEMALES, ANY AGE OR AGES.

Prize, Silver Medal.

Valancey E. Fuller, Hamilton.

CLASS XVI.

HOLSTEINS.—24 ENTRIES.

JUDGES.—Same as for Jerseys.

HOLSTEIN BULL, ANY AGE.

First Prize, $20. Second Prize, $10.

1st Prize, Cook & Lord, Aultsville.
2nd do do do do (imp. in dam), "Quarantine Chief" (bull calf).

HOLSTEIN COW, 3 YEARS OLD AND UPWARDS.

First Prize, $20. Second Prize, $10.

1st Prize, Cook & Lord, Aultsville, (imp.) "Jessie L." (3043) H. H. B.
2nd do do do do "Agate" (1236) H. H. B.

HOLSTEIN HEIFER, 2 YEARS OLD.

First Prize, $10. Second Prize, $5.

1st Prize, Cook & Lord, Aultsville, (imp.) "De Jock" (2919).
2nd do do do do (imp.) "Jacoba H." (2945).

HOLSTEIN HEIFER, UNDER 2 YEARS.

First Prize, $10. Second Prize, $5.

1st Prize, Cook & Lord, Aultsville, (imp.) "Lena L." (3048).
2nd do do do do (imp.) "Nelly Bell" (3045).

HERD OF HOLSTEIN CATTLE, CONSISTING OF ONE BULL AND FOUR FEMALES, ANY AGE OR AGES.

Prize, Silver Medal.

Cook & Lord, Aultsville.

CLASS XVII.

GRADE CATTLE.—90 ENTRIES.

JUDGES.—E. H. Hillburn, Uxbridge; George Hyde, Stratford; Wm. Nugent, Newburg.

GRADE COW.

First Prize, $25. Second Prize, $20. Third Prize, $15.

1st Prize, H. & I. Groff, Elmira.
2nd do do do do
3rd do do do do

GRADE COW, 3 YEARS OLD.

First Prize, $25. Second Prize, $20. Third Prize, $15.

1st Prize, H. & I. Groff, Elmira.
2nd do do do
3rd do Thos. P. Card, Marden.

GRADE HEIFER, 2 YEARS OLD.

First Prize, $20. Second Prize, $15. Third Prize, $10.

1st Prize, John Fothergill, Burlington.
2nd do H. & I. Groff, Elmira.
3rd do do do.

GRADE HEIFER, 1 YEAR OLD.

First Prize, $15. Second Prize, $10. Third Prize, $5.

1st Prize, H. & I. Groff, Elmira.
2nd do George Keith, Elora.
3rd do E. Greville Harston, Ilfracombe.

GRADE HEIFER CALF, UNDER 1 YEAR.

First Prize, $12. Second Prize, $8. Third Prize, $5.

1st Prize, James Slimmon, Winfield,
2nd do George Keith, Elora.
3rd do H. & I. Groff, Elmira.

SPECIAL—GRADE FEMALE, ANY AGE.

(By Empire Horse and Cattle Food Co.), $10.

H. & I. Groff, Elmira.

FOUR GRADE FEMALES, ANY AGE.

(The property of the exhibitor.)

Prize, Silver Medal.

H. & I. Groff, Elmira.

CLASS XVIII.

FAT AND WORKING CATTLE, ANY BREED.—57 ENTRIES.

JUDGES.—Thomas Alison, Galt; Wm. Donaldson, Woodstock; Peter Kennedy, Dominionville.

FAT STEER, 3 AND UNDER 4 YEARS OLD.

First Prize, $30. Second Prize, $20. Third Prize, $10.

1st Prize, H. & I. Groff, Elmira, "Champion."
2nd do do do do "Young Sherman."
3rd do J. & R. McQueen, Salem, "Red Duke."

BEST FAT STEER OR HEIFER, UNDER 3 YEARS.

First Prize, $20. Second Prize, $15. Third Prize, $10.

1st Prize, H. & I. Groff, Elmira, "Elmira."
2nd do do do do "James."
3rd do do do do "Waterloo."

FAT COW, 3 YEARS OLD AND UPWARDS.

First Prize, $30. Second Prize, $20. Third Prize, $10.

1st Prize, H. & I. Groff, Elmira, "Maid of Honour VI."
2nd do John Russell, Brougham, "Duchess."
3rd do J, & R. McQueen, Salem, "Lily."

PAIR OF FAT CATTLE, UNDER 4 YEARS.

First Prize, $30. Second Prize, $15.

1st Prize, H. & I Groff, Elmira, "Champion" and "Sherman."
2nd do do do do "Elmira" and "James."

BEST FAT BEAST FROM ANY OF ABOVE SECTIONS.

Prize, Diploma.

H. & I. Groff, Elmira, "Champion."

YOKE OF WORKING OXEN.

First Prize, $20. Second Prize, $10. Third Prize, $5.

1st Prize, William S. Armstrong, Speedside.
2nd do Donald Robertson, Action.
3rd do W. D. Sorby, Guelph.

YOKE OF THREE-YEAR-OLD WORKING STEERS.

First Prize, $20.

John Brown, Galt.

SHEEP—LONG WOOLLED.

CLASS XIX.

COTSWOLDS.—89 ENTRIES.

JUDGES.—John Bennett, Athol; John Marshall, Doon.

Best ram, 2 shears and over,	James Main, Boyne	$20 00
2nd do	James Main	15 00
Best shearling ram,	James Main	20 00
2nd do	James Main	15 00
3rd do	Henry Arkell, Arkell	10 00
Best ram lamb,	James Main	15 00
2nd do	James Main	12 00
3rd do	James Main	8 00
Best 2 ewes, 2 shears and over,	James Main	16 00
2nd do	James Main	12 00
3rd do	Henry Arkell	8 00
Best 2 shearling ewes,	James Main	16 00
2nd do	James Main	12 00
3rd do	James Main	8 00
Best 2 ewe lambs,	James Main	15 00
2nd do	James Main	10 00
3rd do	James Main	8 00

Best pen of Cotswolds—1 ram any age, 2 ewes, 2 shears and over, 2 shearling ewes, and 2 ewe lambs, James Main ..... Silver Medal.

CLASS XX.

LEICESTERS.—190 ENTRIES.

JUDGES.—James Rowand, Dunblane; William Crawford, Caledon East; John Crawford, Ottawa.

Best ram, 2 shears and over,	William Somers, St. Mary's	$20 00
2nd do	William Whitelaw, Guelph	15 00
3rd do	James S. Smith, Maple Lodge	10 00
Best shearling ram,	E. Gaunt & Sons, St. Helen's	20 00
2nd do	William Somers, St. Mary's	15 00
3rd do	William Whitelaw, Guelph	10 00
Best ram lamb,	William Somers, St. Mary's	15 00
2nd do	John Kelly, jr., Shakespeare	12 00
3rd do	John Kelly, jr.	8 00
Best 2 ewes, 2 shears and over,	John Kelly, jr.	16 00
2nd do	John Kelly, jr.	12 00
3rd do	William Somers	8 00
Best 2 shearling ewes,	William Whitelaw	16 00
2nd do	William Somers	12 00
3rd do	John Kelly, jr	8 00
Best 2 ewe lambs,	William Somers	15 00
2nd do	John Kelly, jr	12 00
3rd do	John Kelly, jr	8 00
Best pen of Leicesters—1 ram any age, 2 ewes, 2 shears and over, 2 shearling ewes, and 2 ewe lambs,	William Somers	Silver Medal.

CLASS XXI.

LINCOLN SHEEP.—114 ENTRIES.

JUDGES.—N. A. Peterson, Ameliasburg; Frank Wyatt, St. Catharines; John Allan, Orillia.

Best ram, 2 shears and over,	Geary Bros., London	$15 00
2nd do	Geary Bros.	10 00
3rd do	John Rowell, Maple Grove	5 00
Best shearling ram,	Geary Bros.	15 00
2nd do	G. & W. Parkinson, Eramosa	10 00
3rd do	Earnest Parkinson, Eramosa	5 00
Best ram lamb,	William Walker, Ilderton	12 00
2nd do	Earnest Parkinson	8 00
3rd do	Earnest Parkinson	4 00
Best 2 ewes, 2 shears and over,	Geary Bros.	15 00
2nd do	Geary Bros.	10 00
3rd do	Andrew Murray, Clanbrassil	5 00
Best 2 shearling ewes,	William Walker	15 00
2nd do	Geary Bros.	10 00
3rd do	Earnest Parkinson	5 00
Best 2 ewe lambs,	Geary Bros.	12 00
2nd do	G. & W. Parkinson	8 00
3rd do	William Walker	4 00
Best pen of Lincolns—1 ram any age, 2 ewes, 2 shears and over, 2 shearling ewes, and 2 ewe lambs,	Geary Bros.	Silver Medal.

SPECIAL.—LONG WOOL SHEEP—ONE MALE AND NINE FEMALES.

(Thorley Horse and Cattle Food Company, Hamilton).

Andrew Murray, Clanbrassil	$35 00
2nd prize, 200 pounds Food, value, Wm. Whitelaw, Guelph	32 00

SHEEP—MEDIUM WOOLLED.

CLASS XXII.

SOUTHDOWNS.—155 ENTRIES.

JUDGES.—John Clark, Lansdowne; James Edge, Edge Hill.

Best ram, 2 shears and over,	John Jackson, Abingdon	$20 00
2nd do	Robert Marsh, Richmond Hill	15 00
3rd do	John Jackson	10 00
Best shearling ram,	B. F. Olmsted, Hamilton	20 00
2nd do	John Jackson	15 00
3rd do	Robert Marsh	10 00

Best ram lamb, B. F. Olmstead		$15 00
2nd do	T. Wilkinson, Renton	12 00
3rd do	Robert Marsh	10 00
Best 2 ewes, 2 shears and over, Robert Marsh		16 00
2nd do	Robert Marsh	12 00
3rd do	T. Wilkinson	8 00
Best 2 shearling ewes, B. F. Olmstead		16 00
2nd do	Robert Shaw, Renton Station	12 00
3rd do	B. F. Olmsted	8 00
Best 2 ewe lambs, T. Wilkinson		15 00
2nd do	B. F. Olmsted	12 00
3rd do	T. Wilkinson	8 00
Best pen of Southdowns—1 ram any age, 2 ewes, 2 shears and over, 2 shearling ewes, and 2 ewe lambs, B. F. Olmsted		Silver Medal.

CLASS XXIII.

SHROPSHIRE DOWNS.—157 ENTRIES.

JUDGES.—Wm. Rolph, Markham; J. C. Douglas, Galt; James Park, Woodstock.

Best ram, 2 shears and over, Geary Bros., London		$20 00
2nd do	John Miller, Brougham	15 00
3rd do	Humphrey Snell & Sons, Clinton	10 00
Best shearling ram, Simon Beattie, Annan, Scotland		20 00
2nd do	Geary Bros., London	15 00
3rd do	Grant & Campbell, Woodville	10 00
Best ram lamb,	Grant & Campbell	15 00
2nd do	Grant & Campbell	12 00
3rd do	John Miller, Brougham	10 00
Best 2 ewes, 2 shears and over, John Miller		16 00
2nd do	John Miller	12 00
3rd do	Humphrey Snell & Sons	8 00
Best 2 shearling ewes, Geary Bros		16 00
2nd do	Grant & Campbell	12 00
3rd do	John Miller	8 00
Best 2 ewe lambs, Grant & Campbell		15 00
2nd do	James R. Phin, Hespeler	12 00
3rd do	Geary Bros	8 00
Best pen of Shropshires—1 ram, any age, 2 ewes, 2 shears and over, 2 shearling ewes, and 2 ewe lambs, Geary Bros		Silver Medal

CLASS XXIV.

HAMPSHIRE AND OXFORDSHIRE DOWNS.—51 ENTRIES.

JUDGES.—Robert Vance, Bethany; John McDermid, Avonmore; J. Cuppage, Orillia.

Best ram, 2 shears and over, Peter Arkell, Teeswater		$20 00
2nd do	John Miller, Brougham	10 00
Best shearling ram, Henry Arkell, Arkell		20 00
2nd do	Peter Arkell, Teeswater	10 00
Best ram lamb, Peter Arkell, Teeswater		10 00
2nd do	Peter Arkell, Teeswater	6 00
Best 2 ewes, 2 shears and over, Peter Arkell, Teeswater		18 00
2nd do	Henry Arkell, Arkell	10 00
Best 2 shearling ewes, Peter Arkell, Teeswater		18 00
2nd do	Henry Arkell, Arkell	10 00
Best 2 ewe lambs, Peter Arkell, Teeswater		10 00
2nd do	Peter Arkell, Teeswater	6 00
Best pen of Hampshire and Oxford Downs—1 ram, 2 ewes, 2 shears and over, 2 shearling ewes, and 2 ewe lambs, Peter Arkell, Teeswater		Silver Medal

CLASS XXV.

MERINOS.—55 ENTRIES.

JUDGES.—Wm. Rolph, Markham: J. C. Douglas, Galt; James Park, Woodstock.

Best ram, 2 shears and over, John C. Smith, Fairfield Plains		$10 00
2nd do	Rock Bailey, Union	5 00
Best shearling ram, Rock Bailey, Union		8 00
2nd do	John C. Smith, Fairfield Plains	4 00
Best ram lamb, John C. Smith, Fairfield Plains		6 00
2nd do	Rock Bailey, Union	3 00
Best 2 ewes, 2 shears and over, Rock Bailey, Union		8 00
2nd do	John C. Smith, Fairfield Plains	4 00

Best 2 shearling ewes, Rock Bailey, Union $6 00
2nd do Rock Bailey, Union 3 00
Best 2 ewe lambs, John C. Smith, Fairfield Plains 6 00
2nd do John C. Smith, Fairfield Plains 3 00
Pen of Merinos—1 ram any age, 2 ewes, 2 shears and over, 2 shearling ewes, and 2 ewe lambs, Rock Bailey, Union ..... Silver Medal

SPECIAL.—SHORT WOOL SHEEP, ONE MALE AND ONE FEMALE.

(Thorley Horse and Cattle Food Co., Hamilton.)

1st Prize, John Jackson, Abingdon. $35 00
2nd do B. F. Olmsted, Hamilton, 200 lbs. Food, value 32 00

CLASS XXVI.

FAT SHEEP.—57 ENTRIES.

JUDGES.—Thomas Alison, Galt; Wm. Donaldson, Woodstock; John Rumey.

Best 2 fat wethers, 2 shears and over, John Rutherford, Roseville $15 00
2nd do John Rutherford, Roseville 10 00
3rd do John Rutherford, Roseville 5 00
Best 2 fat wethers under 2 shears, M. Kirby, Armstrong's Mills 15 00
2nd do John Rutherford, Roseville 10 00
3rd do M. Kirby, Armstrong's Mills 5 00
Best 2 fat ewes, 2 shears and over, John Rutherford, Roseville 15 00
2nd do James Slimmon, Winfield 10 00
3rd do John Rutherford, Roseville 5 00

SPECIAL.—BEST FOUR FAT SHEEP.

(Empire Horse and Cattle Food Co., Mitchell, $10 00.)

John Rutherford, Roseville.

PIGS—SMALL BREEDS.

CLASS XXVII.

IMPROVED BERKSHIRES.—144 ENTRIES.

JUDGES.—R. Currie, Niagara; R. J. Banting, Cookstown; Jos. Cook, Lansdowne; John Paxton, Chatham.

Best boar, over 2 years, Harold Sorbey, Gourock $15 00
2nd do J. G. Snell & Bro., Edmonton 10 00
Best boar, over 1 year and under 2 years, J. G. Snell & Bro., Edmonton 15 00
2nd do do J. G. Snell & Bro., Edmonton 10 00
Best boar, over 6 months and under 12 months, J. G. Snell & Bro., Edmonton 15 00
2nd do do James McNish & Son, Lyn 10 00
3rd do do Harold Sorbey 5 00
Best boar, under 6 months, J. G. Snell & Bro., Edmonton 12 00
2nd do Peter Arkell, Teeswater 8 00
3rd do John Hewer, Guelph 4 00
Boar, any age, Harold Sorbey, Gourock ..... Diploma.
Best sow, over 2 years, J. G. Snell & Bro., Edmonton 15 00
2nd do James McNish & Son, Lyn 10 00
3rd do John Bunyan, Guelph 5 00
Best sow, over 1 year and under 2 years, J. G. Snell & Bro., Edmonton 15 00
2nd do do Harold Sorbey, Gourock 10 00
3rd do do John Hewer, Guelph 5 00
Best sow, over 6 months and under 12 months, J. G. Snell & Bro., Edmonton 15 00
2nd do do John Hewer, Guelph 10 00
3rd do do John Hewer, Guelph 5 00
Best sow, under 6 months, Harold Sorbey, Gourock 12 00
2nd do J. G. Snell & Bro., Edmonton 8 00
3rd do J. G. Snell & Bro., Edmonton 6 00
Best sow, any age, J. G. Snell & Bro., Edmonton ..... Diploma.
Berkshire boar and 2 sows of any age, J. G. Snell & Bro., Edmonton ..... Silver Medal.

CLASS XXVIII.

SUFFOLKS.—130 ENTRIES.

JUDGES.—W. D. Hunter; Amos Marselis, Dunbar; Joseph Dean, Invermay.

JUDGES' REPORT.—We beg to say that the swine on exhibition in this class were the best we have ever seen.

Best boar, over two years, Joseph Featherston, Credit $15 00
2nd do A. Frank & Son, The Grange 10 00
3rd do James Main, Boyne 5 00

Best boar, over 1 year and under 2,	James Main		$15 00
2nd do	Joseph Featherston		10 00
3rd do	A. Frank & Son		5 00
Best boar, over 6 months and under 12,	Joseph Featherston		15 00
2nd do	James Main		10 00
3rd do	A. Frank & Son		5 00
Best boar, under 6 months,	Joseph Featherston		12 00
2nd do	James Main		8 00
3rd do	A. Frank & Sons		4 00
Boar, any age,	James Main		Diploma.
Best sow, over 2 years,	James Main		15 00
2nd do	William McClure, Elder's Mills		10 00
3rd do	Joseph Featherston		5 00
Best sow, over 1 year and under 2 years,	James Main		15 00
2nd do	A. Frank & Son		10 00
3rd do	R. Dorsey & Son, Summerville		5 00
Best sow, over 6 months and under 12 months,	Joseph Featherston		15 00
2nd do	James Main		10 00
3rd do	R. Dorsey & Son		5 00
Best sow, under 6 months,	Joseph Featherston		12 00
2nd do	James Main		8 00
3rd do	William McClure		4 00
Sow, any age,	James Main		Diploma.
Suffolk boar and 2 sows, any age,	James Main		Silver Medal.

CLASS XXIX.

POLAND CHINA.—47 ENTRIES.

JUDGES.—James Ryan, Culloden; Simeon Lemon, Kettleby; H. R. Kidd, Warsaw.

Best boar, over 2 years,	E. W. Ware, Hamilton		$15 00
Best boar, over 1 and under 2 years,	W. G. Baldwin, Colchester		15 00
Best boar, over 6 months and under 12,	W. G. Baldwin		15 00
Best boar under 6 months,	T. & W. Wood, Ospringe		12 00
2nd do	W. G. Baldwin		8 00
Boar, any age,	W. G. Baldwin		Diploma.
Best sow, over 2 years,	W. G. Baldwin		15 00
2nd do	W. G. Baldwin		10 00
Best sow, over 1 and under 2 years,	W. G. Baldwin		15 00
2nd do	W. G. Baldwin		10 00
Best sow, over 6 months and under 12,	W. G. Baldwin		15 00
2nd do	W. G. Baldwin		10 00
Best sow, under 6 months,	W. G. Baldwin		12 00
2nd do	W. G. Baldwin		8 00
Best sow, any age,	W. G. Baldwin		Diploma.
Best boar and 2 sows, any age,	W. G. Baldwin		Silver Medal.

CLASS XXX.

ESSEX PIGS.—68 ENTRIES.

JUDGES.—J. M. Joness, Bowmanville; John Rutherford, Rugby; A. McKellar, Ottawa.

Best boar, over 2 years,	James Anderson, Guelph		$15 00
2nd do	Joseph Featherston, Credit		10 00
Best boar, over 1 year and under 2,	Joseph Featherston		15 00
2nd do	Joseph Featherston		10 00
Best boar, over 6 months and under 12,	Joseph Featherston		15 00
2nd do	James Anderson		10 00
Best boar, under 6 months,	James Anderson		12 00
2nd do	Joseph Featherston		8 00
Best boar, any age,	Joseph Featherston		Diploma.
Best sow, over 2 years,	James Anderson		15 00
2nd do	Joseph Featherston		10 00
Best sow, over 1 and under 2,	James Anderson		15 00
2nd do	Thomas McCrae, Guelph		10 00
Best sow, over 6 months and under 12,	Joseph Featherston		15 00
2nd do	Joseph Featherston		10 00
Best sow, under 6 months,	Joseph Featherston		12 00
2nd do	Joseph Featherston		8 00
Sow, any age,	Joseph Featherston		Diploma.
Essex boar and 2 sows, any age,			Silver Medal.

LARGE BREEDS.

CLASS XXXI.

YORKSHIRE AND OTHER LARGE BREEDS.—59 ENTRIES.

JUDGES—D. Thompson, M.D., Deans; John Pratt, Cobourg.

Best boar, over 2 years,	J. D. Abbott, Everton	$15 00
2nd do	Joseph Featherston, Credit	10 00
Best boar, over 1 year and under 2,	Joseph Featherston	15 00
2nd do	Joseph Featherston	10 00
Best boar, over 6 months and under 12,	John Hewer, Guelph	15 00
2nd do	Joseph Featherson	10 00
3rd do	William McClure, Elder's Mills	5 00
Best boar, under 6 months,	Joseph Featherston	12 00
2nd do	W. H. Matthews, Eramosa	8 00
Best boar, any age,	John Hewer	Diploma.
Sow, over 2 years,	Joseph Featherston	15 00
2nd do	John Hewer	10 00
3rd do	J. D. Abbott	5 00
Best sow, over 1 year and under 2,	John Hewer	15 00
2nd do	Joseph Featherston	10 00
3rd do	Joseph Featherston	5 00
Best sow, over 6 months and under 12,	John Hewer	15 00
2nd do	Joseph Featherston	10 00
3rd do	Joseph Featherston	5 00
Best sow, under 6 months,	Joseph Featherston	12 00
2nd do	W. H. Matthews	8 00
rd do	John Hewer	4 00
Best sow, any age,	John Hewer	Diploma.
Yorkshire or other large breed boar and 2 sows, any age,	John Hewer	Silver Medal.

SPECIAL.—BEST PEN FOUR PIGS, ANY BREED.

John Hewer (Empire Horse and Cattle Food Company of Mitchell), $10 00.

POULTRY, ETC.

CLASS XXXII.

201 ENTRIES.

JUDGES.—E. Kester, Brantford; John Thompson, Gananoque.

Best pair Dorkings, white,	Allan Bogue, London	$3 00
2nd do	Allan Bogue	2 00
3rd do	W. M. Smith Fairfield Plains	1 00
Best pair Dorkings, silver grey,	Allan Bogue	3 00
2nd do	James Main, Boyne	2 00
3rd do	Joseph Foster, Malton	1 00
Best pair Dorkings, coloured,	James Main	3 00
2nd do	John Aldons	2 00
Best pair Polands, white,	Allan Bogue	3 00
2nd do	Allan Bogue	2 00
3rd do	John Aldons	1 00
Best pair Polands, golden,	Allan Bogue	3 00
2nd do	Allan Bogue	2 00
Best pair Polands, silver,	Allan Bogue	3 00
2nd do	Allan Bogue	2 00
3rd do	W. M. Smith	1 00
Best pair Polands, white-crested, black,	Allan Bogue	3 00
2nd do	W. H. Hill, Beachville	2 00
3rd do	Allan Bogue	1 00
Best pair Plymouth Rock,	Frank Shaw, London	3 00
2nd do	William Sunley, Guelph	2 00
3rd do	William Sunley	1 00
Best pair Brahmas, light,	John Cole, jr., Hamilton	3 00
2nd do	John Lyon, Guelph	2 00
3rd do	Joseph Foster, Malton	1 00
Best pair Brahmas, dark,	John Aldons	3 00
2nd do	Joseph Foster	2 00
3rd do	W. H. Hill	1 00

Best pair Cochins, buff,	W. H. Hill		$3 00
2nd do	John Aldons		2 00
3rd do	Frank Shaw		1 00
Best pair Cochins, white,	John Aldons		3 00
2nd do	Joseph Foster		2 00
3rd do	W. H. Hill		1 00
Best pair Cochins, partridge,	Frank Shaw		3 00
2nd do	John Aldons		2 00
3rd do	Joseph Foster		1 00
Best pair Houdans,	Allan Bogue		3 00
2nd do	Joseph Foster		2 00
3rd do	Allan Bogue		1 00
Best pair Game fowls, black-breasted or other reds,	James Main, Boyne		3 00
2nd do	do	J. & T. Gibbs, Guelph	2 00
3rd do	do	William Barber, Toronto	1 00
Best pair Game fowls, duckwing,	William Barber		3 00
2nd do	William Barber		2 00
3rd do	John Campbell, Guelph		1 00
Best pair Game fowls, any other variety,	L. C. Ford, Guelph		3 00
2nd do	John Campbell		2 00
3rd do	L. C. Ford		1 00
Best pair Leghorns, brown,	W. Stahlschmidt, Guelph		3 00
2nd do	W. M. Smith, Fairfield Plains		2 00
Best pair Spanish fowls,	J. M. Carson, Orangeville		3 00
2nd do	T. & W. Wood, Ospringe		2 00
Best pair Hamburgs, golden-pencilled,	Allan Bogue		3 00
2nd do	Allan Bogue		2 00
3rd do	W. H. Hill		1 00
Best pair Hamburgs, silver-pencilled,	Allan Bogue		3 00
2nd do	Allan Bogue		2 00
Best pair Hamburgs, golden-spangled,	W. H. Hill		3 00
2nd do	H. J. Hill, Beachville		2 00
3rd do	W. H. Hill		1 00
Best pair Hamburgs, silver-spangled,	Joseph Foster		3 00
2nd do	John Aldons		2 00
Best pair Hamburgs, black,	Frank Shaw		3 00
2nd do	W. M. Smith		2 00
3rd do	Frank Shaw		1 00
Best pair Crevecours,	W. M. Smith		3 00
2nd do	W. M. Smith		2 00
Best pair Bantams, sebright,	W. H. Hill		3 00
2nd do	W. H. Hill		2 00
3rd do	Joseph Foster		1 00
Best pair Bantams, black-breasted or other reds,	W. J. Harrington, Toronto		3 00
2nd do	W. J. Harrington		2 00
3rd do	John Campbell		1 00
Best pair Bantams, duckwing game,	W. T. Harrington		3 00
2nd do	John Campbell		2 00
3rd do	Oliver Henry, Guelph		1 00
Best pair Bantams, any other variety,	W. H. Hill		3 00
2nd do	W. H. Hill		2 00
Best pair Turkeys, any colour,	James Main		3 00
2nd do	James Anderson		2 00
3rd do	James Main		1 00
Best pair Turkeys, wild,	Thomas P. Card, Marden		3 00
2nd do	W. M. Smith		2 00
Best pair Geese, Bremen,	James Main		3 00
2nd do	James Main		2 00
3rd do	James Main		1 00
Best pair Geese, Toulouse,	James Anderson		3 00
2nd do	Joseph Foster		2 00
Best pair English Geese, grey and common,	Joseph Foster		3 00
2nd do	H. J. Hill		2 00
Best pair Geese, any other kind,	W. M. Smith		3 00
2nd do	John Hewer		2 00
3rd do	W. M. Smith		1 00
Best pair Ducks, Aylesbury,	Allan Bogue		3 00
2nd do	W. M. Smith		2 00
3rd do	Joseph Foster		1 00
Best pair Ducks, Rouen,	James Main		3 00
2nd do	Thomas Davies, Guelph		2 00
3rd do	James Main		1 00
Best pair Pekin ducks,	Joseph Foster		3 00
2nd do	H. J. Hill		2 00
3rd do	Thos. Merlihan, Guelph		1 00
Best pair Ducks, any other kind,	W. M. Smith		3 00
2nd do	W. M. Smith		2 00
Best pair Guinea fowl,	Joseph Foster		3 00
2nd do	Thos. Merlihan		2 00

Best pair Pea fowls, W. M. Smith $3 00
2nd do Chas. Foster, Millgrove 2 00
Best pair any other variety of fowls not included in these sections, W. H. Hill 3 00
2nd do do W. H. Hill 2 00
Best collection poultry, apart from all other entries, W. H. Hill ..... Bronze Medal

SPECIAL—BEST PAIR OF FOWLS, COCK AND HEN, ANY BREED

(Empire Horse and Cattle Food Company, Mitchell), $5 00.

W. H. Hill.

CLASS XXXIII.

CHICKENS, DUCKS, ETC., 1883.—75 ENTRIES.

JUDGES.—F. B. Lewis, Lockport, N. Y.; G. J. Miller, Virgil; Samuel Wood, Malenet, Co. Stormont.

Best pair Dorkings, white, Allan Bogue, London $2 00
2nd do Wm. Smith, Fairfield Plains 1 00
Best pair Dorkings, silver grey, Allan Bogue 2 00
2nd do James Main, Boyns 1 00
Best pair Dorkings, coloured, Allan Bogue 2 00
2nd do James Main 1 00
Best pair Polands, white, Allan Bogue 2 00
2nd do 1 00
Best pair Polands, golden, Allan Bogue 2 00
2nd do W. H. Hill, Beachville 1 00
Best pair Polands, silver, Allan Bogue 2 00
2nd do Allan Bogue 1 00
Best pair Polands, white-cressed, black, Allan Bogue 2 00
2nd do Allan Bogue 1 00
Best pair Plymouth Rock, William Sunley, Guelph 2 00
2nd do W. Sanderson, Stratford 1 00
Best pair Brahmas, light, John Cole, Jr., Hamilton 2 00
2nd do John Cole, Jr. 1 00
Best pair Brahmas, dark, Frank Shaw, London 2 00
2nd do Frank Shaw 1 00
Best pair Cochins, buff, Frank Shaw 2 00
Best pair Cochins, partridge, John Aldons, Berlin 2 00
2nd do W. H. Hill 1 00
Best pair Houdams, John Aldons 2 00
2nd do Joseph Foster, Malton 1 00
Best pair Game fowls, black-breasted and other reds, James Main 2 00
2nd do William Barber, Toronto 1 00
Best pair Game fowls, duckwing, William Barber 2 00
2nd do William Barber 1 00
Best pair Game fowls, any other variety, L. C. Ford, Guelph 2 00
2nd do W. M. Smith 1 00
Best pair Leghorns, white, W. Stohlschmidt, Preston 2 00
2nd do John Chamberlin, Guelph 1 00
Best pair Leghorns, brown, Joseph Foster 2 00
Best pair Hamburgs, golden pencilled, Allan Bogue 2 00
2nd do Allan Bogue 1 00
Best pair Hamburgs, silver-pencilled, Allan Bogue 2 00
2nd do W. H. Hill 1 00
Best pair Hamburgs, golden-spangled, W. H. Hill 2 00
2nd do W. H. Hill 1 00
Best pair Hamburgs, silver-spangled, W. H. Hill 2 00
2nd do W. H. Hill 1 00
Best pair Hamburgs, black, H. J. Hill 2 00
2nd do Frank Shaw 1 00
Best pair Crevecours, W. M. Smith 2 00
Best pair Bantams, Sebright, W. H. Hill 2 00
2nd do W. H. Hill 1 00
Best pair Bantams, black-breasted or other reds, W. T. Harrington, Toronto 2 00
2nd do James Anderson, Guelph 1 00
Best pair Bantams, duckwing game, Oliver Henry, Guelph 2 00
2nd do W. T. Harrington 1 00
Best pair Bantams, any other variety, H. J. Hill 2 00
2nd do W. H. Hill 1 00
Best pair Turkeys, any colour, James Anderson 2 00
2nd do James Main 1 00
Best pair Turkeys, wild, James Anderson 2 00
2nd do Charles Foster 1 00
Best pair Geese, Bremen, James Main 2 00
Best pair Geese, Toulouse, James Anderson 2 00
2nd do Joseph Foster 1 00

Best pair Geese, English grey and common, Joseph Foster	$2 00
Best pair Ducks, Aylesbury, Allan Bogue	2 00
2nd do Allan Bogue	1 00
Best pair Ducks, Rouen, James Main	2 00
2nd do James Main	1 00
Best pair Ducks, any other kind, Allan Bogue	2 00
2nd do Oliver Henry, Guelph	1 00
Best pair Pea fowls, W. M. Smith	2 00
Best pair any other variety not included in these sections, John Aldons, Berlin	2 00

PIGEONS.

Best Pair Carrier pigeons, James O. Weldon, London	2 00
2nd do James O. Weldon	1 00
Best pair Pouter pigeons, James O. Weldon	2 00
2nd do James O. Weldon	1 00
Best pair Tumbler pigeons, James O. Weldon	2 00
2nd do James O. Weldon	1 00
Best pair Jacobins pigeons, James O. Weldon	2 00
2nd do James O. Weldon	1 00
Best pair Fantail pigeons, James O. Weldon	2 00
2nd do Nicol Jeffrey, Guelph	1 00
Best pair Barb pigeons, James O. Weldon	2 00
2nd do William Barber, Toronto	1 00
Best pair Trumpeter pigeons, James O. Weldon	2 00
2nd do James O. Weldon	1 00
Best collection of pigeons, any other kind, James O. Weldon	Bronze Medal

RABBITS.

Best pair Long-eared rabbits, William Barber, Toronto	2 00
2nd do W. H. Hill	1 00
Best pair common rabbits, Alexander Mutrie, Oustic	2 00

CLASS XXXV.

AGRICULTURAL IMPLEMENTS.—188 ENTRIES.

JUDGES.—Joshua Smithson, Graystock; James Moore, Hastings; L. Van Camp, Bowmanville; Jessie Trull, Oshawa.

Best double mould plough, Charles Thain, Guelph	10 00
2nd do Munro & Gerrie, Salem	7 00
3rd do G. Wilkinson, Aurora	4 00
Best gang plough, Beatty Bros., Fergus	10 00
2nd do Cockshutt Plough Co., Brantford	8 00
3rd do Thomas Gowdy & Co., Guelph	4 00
Best horse-hoe or single horse cultivator, iron, Gotthil Bettschen, New Dundee	4 00
2nd do do do B. Bell & Son, St. George	3 00
3rd do do do J. H. Groat & Co., Grimsby	2 00
Best horse-hoe or single horse cultivator, wood, Thomas Gowdy & Co.	4 00
2nd do do do Gotthil Bettschen	3 00
3rd do do do J. H. Groat & Co.	2 00
Best root seed drill, horse, two drills sown, B. Bell & Son	4 00
2nd do do do Thomas Gowdy & Co.	3 00
3rd do do do Charles Thain	2 00
Best iron beam plough, with steel mould board and wood handles, Thomas Gowdy & Co.	10 00
2nd do do do do Beatty Bros., Fergus	6 00
3rd do do do do Tolton Bros., Guelph	4 00
Best iron plough, G. Wilkinson	15 00
2nd do John Bennett, Chatham	10 00
Best chill plough, with jointer attachment, B. Bell & Son	10 00
2nd do do do Thomas Gowdy & Co.	6 00
3rd do do do Ayr American Plough Co.	4 00
Best subsoil plough, Ayr American Plough Co.	10 00
Best wooden plough, Tolton Bros., Guelph	10 00
2nd do Thomas Gowdy & Co.	8 00
3rd do Cockshutt Plough Co.	4 00
Best machine for cutting roots for stock, B. Bell & Son	8 00
2nd do do do P. E. Shantz, Preston	6 00

Best machine for pulping roots, David Maxwell, Paris	$8 00
2nd do do B. Bell & Son	6 00
Best pair of iron harrows, Tolton Bros.	10 00
2nd do William Tinney, Cavan	8 00
3rd do John Bennett, Chatham	6 00
Best wooden roller, B. Bell & Son	10 00

SPECIAL.—Largest and best collection of agricultural implements and machines; National Manufacturing Company of Ottawa, a tent, value 50 00

This prize was awarded to the Watson Manufacturing Company of Ayr, but the award was protested on the plea that the Watson exhibit contained a number of ploughs entered by the Ayr American Plough Company. The council, not getting satisfactory information, by resolution decided not to grant the prize this season.

EXTRAS.

Bronze Medal:—Sulky Plough, steel beam, chill board, Syracuse Chill Plough Co., Syracuse, N.Y.

Diplomas:—Exhibit of ploughs, Ayr American Plough Co., Ayr, Ont. Nursery Plough, cast mould, John H. Groat & Co., Grimsby. All Steel Harrow, Tolton Bros., Guelph. New Patent Scarifier, Docking Bros., Britannia Agricultural Works, Waterdown. Collection of Ploughs, Scrapers, Wheelbarrows, Bagtrucks, etc., B. Bell & Son, St. George. Corn-sheller, Patterson & Bros., Whitby. Sulky Plough, Gang Plough, Cockshutt Plough Co., Brantford. Onondaga Road Scraper, Gregory & Austin, Hamilton. Sergeant's Patent Load-lifting machine, William Sergeant, Berkeley. Collection of Ploughs and Scraper, G. Wilkinson, Aurora.

Highly Commended:—Two-horse Iron Cultivator, for destroying thistles, One-horse Iron Cultivator, Tolton Bros., Guelph.

CLASS XXXVI.

CARRIAGES AND SLEIGHS AND PARTS THEREOF.—156 ENTRIES.

JUDGES.—William Ramsay, Orillia; L. Graybill, Waterloo; M. McIntyre, Gananoque.

Best axle, wrought iron, T. Pepper & Co., per John M. Bond & Co., agents, Guelph	$4 00
Best axle, steel, T. Pepper & Co., per John M. Bond & Co.	4 00
2nd do Guelph Carriage Goods Co., Guelph	2 00
Best buggy, double seated, covered, W. Gray, Chatham	8 00
2nd do do Gananoque Carriage Works, Gananoque	6 00
Best buggy, double seated, uncovered, John McConnell, Guelph	6 00
Best buggy, single seated, covered, John McConnell	8 00
2nd do do S. & G. Penfold, Guelph	6 00
Best buggy, single seated, uncovered, John McConnell	6 00
2nd do do John McConnell	4 00
Best carriage, two-horse, pleasure, W. Gray, Chatham	12 00
2nd do do John McConnell	8 00
Skeleton speeding waggon, John McConnell	6 00
Carriage and buggy, woodwork, assortment of, Biggs & Watson, Berlin	10 00
2nd do do do John McConnell	6 00
Two-passenger village road cart, Gananoque Carriage Works	6 00
Pair bob sleighs, Munro & Gerrie, Salem	8 00
2nd do Charles Thain, Guelph	4 00
One-horse cart, Peter Adams, Paris	6 00
Hubs, carriage, one dozen, Ohio Wheel Co., Delphor, Ohio, per J. M. Bond & Co., agents, Guelph	3 00
2nd do F. W. Hore & Son, Hamilton	2 00
Omnibus, James St. Charles, Belleville	12 00
Two-horse team waggon, iron axle, Peter Adams, Paris	12 00
Two-horse team waggon, thimble skein, Peter Adams	12 00
2nd do do do Gananoque Carriage Works	8 00
Phæton, uncovered, W. Gray	6 00
2nd do John McConnell	4 00
Phæton, covered, W. Gray	6 00
2nd do John McConnell	4 00
Best pleasure cutter, Robert Parker, Guelph	6 00
2nd do John McConnel	4 00
Best sleigh, two-horse, pleasure, John McConnel	8 00
2nd do Peter Filman, Hamilton	6 00
Best and largest display of vehicles William Gray & Son, Chatham	Silver Medal.
Best spokes, carriage, twelve sets, F. W. Hore & Son, Hamilton	3 00
2nd do do E. H. Phelps & Co., Merritton, per J. M. Bond & Co., Agents	2 00
Best springs, one set steel carriage, Warnock & Co., Galt	5 00
2nd do do Guelph Carriage Goods Co	3 00
Best one-horse, light market waggon, Gananoque Carriage Works	10 00
Best two-horse spring market waggon, Gananoque Carriage Works	10 00
2nd do W. Gray	5 00
Best wheels, one pair carriage, unpainted, John McConnell	4 00
2nd do do F. W. Hore & Son	2 00

Best collection of carriage material, F. W. Hore & Son.....Bronze Medal.
2nd do do E. H. Phelps & Co., per J. M. Bond & Co., Agts. 3 00
Best collection of carriage and waggon hardware, Alexander Smith, London.. .....Bronze Medal.

EXTRAS

Bronze Medals.—Collection, Axles and Buggy Gear, Harford Ashley, Belleville. Team Lorrie, Peter Adams, Paris.

Diplomas.—Two-horse team Waggon, thimble skein, Chatham Mfg. Co., Chatham. Model Combined Waggon Box and Hay Rack, Model of Patent Covered Democrat, H. Glazebrook, Simcoe. Assortment of Carriage Dashes, McKinnon & Mitchell, St. Catharines. Covered Buggy, single seated, with Armstrong's patent cast steel Eureka Gear. Armstrong's Phæton Eureka Gear, Guelph Carriage Goods Co. Patent metal buggy Hub, hub and wheel complete, Francis Culham, Princeton. Market Bob-sleighs, Peter Filman, Hamilton. Assortment of Buggy gear, Alexander Smith, London. Assortment Buggy gear drop plates and patent wheels, T. B. Dowsley, Owen Sound. Dumping Waggon, Henry Leggett, Renfrew. Steel Skein waggon, one-horse Sleigh, Peter Adams, Paris. Assortment Gears, Wheels and Bodies, Gananoque Carriage Works.

Highly Commended.—Equalizing Double-tree for waggon, Edward Howe, Hillsburg. W. A. Eddy's patent anti-rabbler, assort. Buggy Tops, Cober & Bechtel, Hespeler. Iron Roller for sleigh tongues, Peter Filman, Hamilton. Patent Buggy, John McConnell, Guelph.

CLASS XXXVII.

AGRICULTURAL TOOLS AND IMPLEMENTS, CHIEFLY FOR HAND USE.—85 ENTRIES.

JUDGES.—D. A. Burdett, Newburgh; J. S. Bates, Smithville.

Best set draining tools, D. F. Jones & Co., Gananoque, per J. M. Bond & Co. Agents..... $6 00
Best assortment of drain tiles, Geo. Deller, Norwich..... 4 00
Best half-dozen spades, D. F. Jones & Co., per J. M. Bond & Co. Agents..... 3 00
2nd do E. A. Barnes & Co., per Risley & Kerrigan, Agents, Toronto..... 2 00
Best half-dozen steel hoes, The Welland Vale Manufacturing Company, St. Catharines, per J. M. Bond & Co..... 3 00
2nd do Auburn Manufacturing Company, per Risley & Kerrigan, Agents..... 2 00
3rd do A. S. Whiting Manufacturing Company, Allandale, per J. M. Bond & Co., Agents..... 1 00
Best half-dozen steel shovels, G. A. Baines & Co., per Risley & Kerrigan..... 3 00
2nd do D. F. Jones & Co., Gananoque, per J. M. Bond & Co., Agents..... 2 00
Best half-dozen grain scoops, G. A. Baines & Co., per Risley & Kerrigan..... 3 00
2nd do D. F. Jones & Co., per J. M. Bond & Co., Agents..... 2 00
Best half-dozen manure forks, The Welland Vale Manufacturing Company, per J. M. Bond & Co.. 3 00
2nd do Auburn Manufacturing Company, per Risley & Kerrigan..... 2 00
3rd do A. S. Whiting Manufacturing Company, per J. M. Bond & Co..... 1 00
Best half-dozen spading forks, The Welland Vale Manufacturing Company, per J. M. Bond & Co.. 3 00
2nd do Auburn Manufacturing Company, per Risley & Kerrigan..... 2 00
3rd do A. S. Whiting Manufacturing Company, per J. M. Bond & Co..... 1 00
Best half-dozen scythe snaiths, A. S. Whiting Manufacturing Company, per J. M. Bond & Co..... 3 00
Best grain cradle, H. E. Ketchum, Strathroy, per J. M. Bond & Co..... 2 00
Best half-dozen grass scythes, Auburn Manufacturing Company, per Risley & Kerrigan..... 3 00
2nd do Welland Vale Manufacturing Company, per J. M. Bond & Co..... 2 00
Best half-dozen cradle scythes, Auburn Manufacturing Company, per Risley & Kerrigan..... 3 00
2nd do The Welland Vale Manufacturing Company, per J. M. Bond & Co.. 2 00
Best lawn mower, William Russell, Guelph..... 6 00
2nd do Thos. Gowdy & Co., Guelph..... 3 00
Best half-dozen hay rakes, H. E. Ketchum, per J. M. Bond & Co..... 3 00
Best half-dozen hay forks, Auburn Manufacturing Company, per Risley & Kerrigan..... 4 00
2nd do A. S. Whiting Manufacturing Company, per J. M. Bond & Co..... 2 00
3rd do The Welland Vale Manufacturing Company, per J. M. Bond & Co..... 1 00
Best straw or barley fork, wood, H. E. Ketchum, per J. M. Bond & Co..... 2 00
Best half-dozen axe handles, John Kelley, Dartford..... 2 00
2nd do C. Lewis, Salford..... 1 00
Best set heavy horse shoes, Samuel Doak, Hamilton..... 3 00
2nd do Canada Spring Horse Shoe Company, Picton..... 2 00
Best set horse shoes, light, Canada Spring Horse Shoe Company..... 3 00
2nd do Samuel Doak..... 2 00
Best farm gate, Edmund J. W. Helyer, London..... 3 00
Best assortment agricultural tools for hand use, of Canadian manufacture, The A. S. Whiting Manufacturing Company, per J. M. Bond & Co.....Diploma.
Best apple parer, William Russell, Guelph..... 3 00
2nd do William Russell..... 2 00
Best fruit evaporator, J. A. & A. Bartholomew, Vanessa..... 8 00

EXTRAS.

Silver Medal.—General collection of Canadian Manufactures, William Russell, Guelph.

Diplomas.—Farmer's Bag Barrow, Watson Manufacturing Company, Ayr. Collection Steel Lawn Rakes, Potato Hooks, Hay Knife etc., Auburn Manufacturing Company, per Risley & Kerrigan, Agent, Toronto. Straw Cutter for hand use, R. E. Bush, Berlin.

Highly Commended.—Lorrie or Patent Truck, F. Merner & Co., New Hamburg.

AGRICULTURAL PRODUCTS.

CLASS XXXVIII.

FIELD GRAINS, HOPS, ETC.—354 ENTRIES.

JUDGES.—James Barnum, Grafton; B. W. Wilson, Ridgetown, Neil Cassidy, Port Elgin; George A. Nolan, Tottenham.

1st Prize,	The Canada Company's prize for the best 25 bushels of Fall Wheat, the produce of the Province of Ontario, being the growth of 1883. Each sample must be of one distinct variety, pure and unmixed, of the best quality for seed, and not be tested merely by weight. The prizes to be awarded to the actual grower only of the wheat, which is to be given up to and become the property of the Association, for distribution in the several Agricultural Districts for seed.—William Harvey, Freeman			$100 00
2nd	do	By the Association	Robert Tuck, Freeman	30 00
3rd	do	do	William Tuck, Waterdown	15 00
Best white winter wheat, 2 bushels, Robert Tuck				10 00
2nd	do	do	W. W. Smith, Fairfield Plains	8 00
3rd	do	do	James McCrone, Normandale	6 00
4th	do	do	William Tuck	4 00
Best red winter wheat, 2 bushels, W. M. Smith				8 00
2nd	do	do	William Mitchell, Waterloo	6 00
3rd	do	do	H. L. Ross, Georgetown	4 00
4th	do	do	Thomas Chisholm, Mansewood	2 00
Clawson wheat, 2 bushels, William Hartley, Freeman				8 00
2nd	do	Louis Kochler, Waterloo		6 00
3rd	do	T. & J. Manderson, Myrtle		4 00
Best Fyfe spring wheat, 2 bushels, T. & J. Manderson				8 00
2nd	do	do	E. C. Bennet, Clarksburg	6 00
3rd	do	do	Charles Grant, Thornbury	4 00
Best spring wheat of any other variety, 2 bushels, Robert Tuck				8 00
2nd	do	do	T. & J. Manderson, Myrtle	6 00
3rd	do	do	E. C. Bennett, Clarksburg	4 00
4th	do	do	James Crerar, Shakespeare	2 00
Best barley (2 rowed), 2 bushels, Charles Grant, Thornbury				6 00
2nd	do	T. & J. Manderson, Myrtle		4 00
3rd	do	Simpson Rennie, Milliken		2 00
Best barley (6 rowed), 2 bushels, Charles Grant, Thornbury				6 00
2nd	do	Simpson Rennie		4 00
3rd	do	William Tuck		2 00
Best barley, black, Charles Ross, Marden				6 00
Best winter rye, 2 bushels, W. C. Brown, Meadowvale				6 00
2nd	do	Charles Foster, Milligrave		4 00
3rd	do	Thos. Evans & Bros., Hespeler		2 00
Best oats (white), 2 bushels, Simpson Rennie				6 00
2nd	do	W. M. Smith		4 00
3rd	do	Enoch Erb, Waterloo		2 00
Best oats (black), 2 bushels, Enoch Erb				6 00
2nd	do	Conrad Bierman, Waterloo		4 00
3rd	do	Louis Kochler, Waterloo		2 00
Best small field peas, 2 bushels, T. & J. Manderson				6 00
2nd	do	Robert Talbot, Everton		4 00
3rd	do	Charles Grant, Thornbury		2 00
Best Marrowfat peas, 2 bushels, Charles Scott, Melville Cross				6 00
2nd	do	Walter Hartman, Clarksburg		4 00
3rd	do	T. & J. Manderson		2 00
Best field peas, 2 bushels of any other kind, Joshua Norrish, Eden Mills				6 00
2nd	do	do	Walter Hartman, Clarksburg	4 00
3rd	do	do	T. & J. Manderson	2 00
Best small white field beans, bushel, C. Lewis, Salford				6 00
2nd	do	do	Henry Lutz, Stoney Creek	4 00
3rd	do	do	J. D. Lutz, Stoney Creek	2 00
Best large white field beans, bushel, William Mitchell, Waterloo				6 00
2nd	do	do	C. Lewis, Salford	4 00
3rd	do	do	Henry Lutz	2 00
Best Indian corn in the ear (white), 2 bushels, J. D. Lutz				6 00
2nd	do	do	Henry Lutz	4 00
Best Indian corn (yellow), 2 bushels, Henry Lutz				6 00
2nd	do	do	J. D. Lutz	4 00
3rd	do	do	John C. Smith	2 00
Best sweet corn, 1 bushel, George Cairns, Virgil				5 90
Best bale of hops, not less than 160 lbs., H. L. Ross, Georgetown				15 00
2nd	do	do	William R. Elliot, Guelph	10 00
3rd	do	do	Samuel Mabey, Grimsby	5 00

SPECIAL.—"The Farmer's Advocate" prize of $100, given annually by Wm. Weld, editor and proprietor of that paper, was awarded at the Provincial Exhibition, for the best samples of wheat.

Best variety of fall or winter wheat for the general farmer to raise, William Tuck, Waterdown..... $30 00
2nd do do do H. L. Ross, Georgetown.. ..... 20 00

STATEMENT.

Variety, Deihl, a white winter wheat.—This wheat was introduced into our section of the country in 1876 by Mr. Louis Springer, of Barton. It yields well; last year I had forty bushels to the acre. It was grown on rolling, clay loam land, on summer fallow, ploughed three times, used about five loads of manure to the acre, it surpasses any other kind of wheat for milling purposes.

(Signed.) W. TUCK.

STATEMENT.

Egyptian Amber Wheat.—This is a bearded variety of red fall wheat, a hardy, strong, vigorous grower, and is well adapted for poor and exhausted soils. It is a new wheat, comparatively speaking, and was introduced here some three years ago by Mr. Robert Noble, of Norval Co., Halton, one (if not the most extensive millers west of Toronto) of the most enterprising, who is always ahead in keeping the farmers of his district supplied with the very best kinds of wheat, which proves to be mutually advantageous.

The Egyptian Amber grows with a stiff straw, and presents a fine golden appearance to the eye just before and when ready for the reaper, no variety growing so evenly: hence the work of harvesting can be profitably done.

The sample shown was the growth of 1883, on a clay loam soil, prepared by summer fallow, with barnyard manure applied to the previous crop, sown in the last week of September, 1882. The situation is exposed and bleak, it had a small top last fall, and when the late frost ceased in the spring the field looked rather bare for a promising crop; but it soon made a change in appearance, shooting up numerous strong, healthy stools, and finally it gave as thick and even a crop as I ever saw. In 1882 it yielded fifty-five bushels per acre, and is now well distributed amongst the farmers in the county of Peel and Halton.

Respectfully submitted,

(Signed.) H. L. ROSS.

Georgetown.

Best variety of spring wheat for the general farmer to raise, Mrs. Charles Tuck, Waterdown..... 30 00
2nd do do do W. M. Smith, Fairfield Plains 20 00

STATEMENT.

Variety, White Russian.—This wheat was first purchased from Mr. Charles McManus, of East Flamboro, about six years ago. It was grown on clay loam, after a root crop. It averaged thirty-one bushels to the acre. It has a good straw, and is not liable to rust. It was very widely sown this year in our neighbourhood, and has good milling qualities.

(Signed.) MRS. CHARLES TUCK.

STATEMENT.

Variety, McKerlie.—Spring wheat, grown on sandy soil with clay and gravel subsoil. Had about thirty bushels per acre, weighing sixty-six pounds per bushel, grown on corn ground. It is a bearded wheat, with plenty of straw, and does the best of any kind of spring wheat grown in the county of Brant, and is liked by the millers.

EXTRAS.

Collection of grain in Straw, Charles Grant, Thornbury..... .....Diploma.

CLASS XXXIX.

SMALL FIELD SEEDS, FLAX, HEMP, &C.—70 ENTRIES.

JUDGES.—R. L. Denison, Toronto; John Pike, Woodstock.

(A special prize given by Mr. Jas. Rennie, of the Market Seed Store, Toronto.)

Timothy seed, bushel, W. Hartman, Clarksburg..... .....Chill Plough.
2nd do T. & J. Manderson, Myrtle..... ..... $4 00
3rd do R. Ibbotson, Arthur..... 2 00
Best clover seed, bushel, W. M. Smith, Fairfield Plains..... ..... 6 00
2nd do Henry Lutz, Stoney Creek..... ..... 4 00
Best Alsike clover seed, half bushel, John C. Smith, Fairfield Plains 6 00
2nd do W. M. Smith 4 00
Best flax seed, bushel, Charles Grant, Thornbury.. .... 6 00
2nd do Thomas M. Taylor, Eden Mills 4 00
3rd ko W. Hartman 2 00
Best swedish turnip seed from transplanted bulbs, not less than 12 lbs., John Crumb, Bowmanville., 4 00
2nd do Alfred Crumb, do 3 00
Best grey stone turnip seed, 12 lbs., John Crumb..... .. 4 00
2nd do Alfred Crumb..... ..... 3 00

Best white Belgian field carrot seed, 12 lbs.,	Alfred Crumb	$4 00
2nd do	John Crumb	3 00
Best long red mangel-wurzel seed, 12 lbs.,	Alfred Crumb	4 00
Best yellow globe mangel-wurzel seed, 12 lbs.,	John Crumb	4 00
Best tares, bushel	Charles Grant	3 00
2nd do	Charles Grant	2 00
Best Buckwheat, bushel,	D. Lutz, Stoney Creek	2 00
2nd do	Henry Lutz	1 00
Best millet, bushel,	Charles Grant	4 00
2nd do	W. M. Smith, Fairfield Plains	2 00
Hungarian grass seed, bushel,	Charles Grant	4 00
2nd do	John C. Smith	2 00

Extra Entries.

Orchard grass seed, W. Hartman, Clarksburg	Diploma.
Parsnip seed, Thos. Card Marden	Diploma.

CLASS XL.

Field Roots, &c.—375 Entries.

Judges.—Henry Anderson, Wilton Grove; Robert Lees, Ottawa; Thomas Partridge, London.

Best Snowflake potatoes, bushel,	En Erb, Waterloo	$3 00
2nd do	Louis Kochler, Waterloo	2 00
3rd do	William Mitchell, do	1 00
Best Early Ohio,	Louis Kochler	3 00
2nd do	Conrad Bierman, Waterloo	2 00
Best Pride of America,	Louis Kochler	2 00
Best Magnum Bonum,	Louis Kochler	2 00
Best Early Rose potatoes, bushel,	Daniel McMillen, Clarksburg	3 00
2nd do	Louis Kochler	2 00
3rd do	Enoch Erb	1 00
Best Late Rose potatoes, bushel,	Enoch Erb	3 00
2nd do	Daniel McMillan	2 00
3rd do	Conrad Bierman	1 00
Best Hebron potatoes, bushel,	Enoch Erb	3 00
2nd	Conrad Bierman	2 00
3rd	Charles Scott, Melville Cross	1 00
Best Brownell's Beauty (Third Prize),	John Hewer, Guelph	1 00
Best Brownell's Best,	Charles Foster, Millgrove	3 00
Best Breeze's Peerless, bushel,	Louis Kochler	3 00
2nd do	John Hewer, Guelph	2 00
Best White Star,	W. M. Smith	3 00
2nd do	Louis Kochler	2 00
3rd do	Wood Freeman, Freeman	1 00
Best Burbank Seedling,	Louis Kochler	3 00
2nd do	Daniel McMillan, Hillsburg	2 00
3rd do'	H. McDougall, Guelph	1 00
Best Dempsey potatoes, bushel,	Louis Kochler	3 00
Best any other sort of potatoes, bushel,	Louis Kochler	3 00
2nd do	George S. Armstrong, Fergus	2 00
3rd do	Enoch Erb	1 00
Best Seedling potatoes,	Louis Kochler	3 00
2nd do	Charles Foster, Millgrove	2 00
3rd do	W. H. Marcon, Guelph	1 00
Best collection of field potatoes, peck of each sort, named,	Louis Kochler	6 00
2nd do	Wood Freeman	4 00
3rd do	John Hewer	2 00
Best eight roots Purple Swede turnips,	Thos. Talbot, Ospringe	3 00
2nd do	W. J. Thompson, Orkney	2 00
3rd do	F. H. Miller, West Flamboro	1 00
Best eight roots Bronze Swede turnips.	F. H. Miller	3 00
2nd do	Thomas Talbot	2 00
3rd do	W. J. Thompson	1 00
Best eight roots Green Swede turnips	W. J. Thompson	3 00
2nd do	F. H. Miller	2 00
3rd do	Hugh Black, Rockwood	1 00
Best eight roots White Swede,	Thomas Talbot	3 00
2nd do	William Young	2 00
3rd do	Charles Scott, Melville Cross	1 00
Best eight roots White Globe turnips,	Charles Scott	3 00
2nd do	William Young, Orangeville	2 00
3rd do	Conrad Biermann	1 00

Best eight roots Greystone turnips,		F. H. Miller	$3 00
2nd	do	Charles Scott	2 00
3d	do	John Bolton, Armstrong's Mill	1 00
Best eight roots Aberdeen Yellows,		Charles Scott	3 00
2nd	do	William Young	2 00
Best eight roots Purple Top Aberdeen,		Charles Scott	3 00
Best four varieties turnips, eight of each,		Charles Scott	2 00
Best twelve roots red carrots,		William Young	3 00
2nd	do	Louis Kochler	2 00
3rd	do	John Hewer	1 00
Best twelve roots white or Belgian carrots,		John S. Webb, Everton	3 00
2nd	do	T. Sherwood, Fergus	2 00
3rd	do	William Mitchell, Waterloo	1 00
Best eight roots mangel-wurzel, long red,		Robert Talbot	3 00
2nd	do	John Ramsay, Eden Mills	2 00
3rd	do	P. J. Woods, Guelph	1 00
Best eight roots red Globe mangel-wurzel,		Simpson Rennie, Milliken	3 00
2nd	do	P. J. Woods	2 00
Best eight roots yellow Globe mangel-wurzel,		Simpson Rennie	3 00
2nd	do	P. J. Woods	2 00
3rd	do	William Grierson, Guelph	1 00
Best eight roots long yellow mangel-wurzel,		Simpson Rennie	3 00
2nd	do	William Grierson	2 00
Best eight roots Kohl Rabi,		Charles Scott	3 00
2nd	do	William Young	2 00
3rd	do	Louis Kochler	1 00
Best eight roots white sugar beet,		P. J. Woods	3 00
2nd	do	W. H. Marcon	2 00
3rd	do	Charles Scott	1 00
Best twelve roots parsnips,		T. Sherwood, Fergus	3 00
2nd	do	P. J. Woods	2 00
Best twelve roots chicory,		Louis Kochler	3 00
2nd	do	Charles Scott	2 00
Best two large squashes for cattle,		Louis Kochler	3 00
2nd	do	William Mitchell	2 00
Best four common yellow field pumpkins,		Conrad Biermann	2 00
For the best and most creditable assortment of field roots, any kind,		P. J. Woods	Bronze Medal.

EXTRAS.

Collection "Golden Tankard," "Yellow Intermediate," and "Red Intermediate" mangel-wurzels. P. J. Woods ..... Diploma.

DAIRY PRODUCTS, ETC.

CLASS XLI.

DAIRY PRODUCTS, ETC.—238 ENTRIES.

JUDGES.—D. W. McPherson, Lancaster; G. J. Brill, Guelph.

(The following prizes are offered by the Agriculture and Arts Association of Ontario, and the Dairymen's Association of Western and Eastern Ontario.)

Three firkins of butter, fitted for exportation, not less than 50 lbs. in each firkin, made at any butter factory or creamery, working capacity not less than 100 cows milk, exhibitors to furnish mode of manufacture, including breed and number of cows, description of factory, treatment of milk, quantity, brand, and make of salt used, and other practical information that they may be able to afford before being paid the amount of premium. For exportation.

1st Prize (Dairy),		William Flewelling, Barnett	$20 00
2nd	do	John Taylor, Rockwood	12 00
3rd	do	John McClurg, Falkirk	8 00
4th	do	Mrs. J. Grieve, Oustic	4 00
1st Prize (Creamery),		Charles Snedecker, Mayville	25 00
2nd	do	David Slaughter, Mayville	15 00
3rd	do	A. R. Good, Ayton	10 00
4th	do	Moses Good, Formosa	5 00

Best firkin of butter not less than 50 lbs. in shipping order, manufactured at any private dairy, or creamery, capacity and manufacture not over 50 cows. For exportation.

1st Prize (Dairy),		Thomas Waters, Rockwood	12 00
2nd	do	Robert McClure Brampton	8 00
3rd	do	William Flewelling	6 00
4th	do	James Lindsay, Fergus	4 00
1st Prize (Creamery),		Charles Snedecker	15 00
2nd	do	Enoch Erb, Waterloo	10 00

Butter, not less than 28 lbs., in firkin, crocks or tubs, "for home use," "home consumption."

1st Prize,	Robert McClure, Brampton		$8 00
2nd Prize,	James Adamson, Nassagaweya		6 00
3rd	do	James Lindsay, Fergus	4 00
4th	do	Peter Dunbar, Morden	2 00

Butter not less than 10 lbs., in rolls, prints or pats, "Table use," home consumption, known as 5 day butter.

1st Prize,	George Coghlan, Eramosa		8 00
2nd	do	John McGill, Eramosa	6 00
3rd	do	Mrs. J. Grant, Aberfoyle	4 00
4th	do	James S. Armstrong, Speedside	2 00

Three factory Cheese (white), capacity of factory and manufacture of not less than the milk of 100 cows. Best Cheese made during the 1st 15 days in August, 1883.

1st Prize,	James Whitton, Wellmans' Corners	35 00
2nd	E. J. Drewry, Campbellford	25 00
3rd	Andrew Clancy, Springbrook	15 00
4th	B. J. Connolly, Lucknow	10 00
5th	John S. Drewry, Rylstone	6 00

Three factory cheese (colored), capacity of factory and manufacture of not less than 100 cows milk. Best cheese made during the first 15 days in August, 1883.

1st Prize,	G. C. Ross, Millarton		35 00
2nd	do	A. S. Bell, Sebringville	25 00
3rd	do	James Whitton, Wellmans' Corners	15 00
4th	do	George Barthel, Stratford	10 00
5th	do	Thomas F. Mitchell, New Hamburg	6 00

Best three Dairy Cheese not less than 30 lbs.

1st Prize,	James Anderson, Guelph		8 00
2nd	do	Mrs. T. Ware, Guelph	6 90
3rd	do	Enoch Erb, Waterloo	4 00

Best three Stilton Cheese, not less than 8 pounds each.

1st Prize,	James Liddle, Dundas		8 00
2nd	do	Eliza Parsons, Guelph	6 00

Best Gloucester or Wiltshire Loaf or Truckle Cheese, not less than 8 lbs. each.

1st Prize,	Charles Evans, Hammond		8 00
2nd	do	Andrew Clancey, Springbrook	6 00
3rd	do	James Whitton, Wellmans' Corners	4 00

Best collection of Butter Tubs, for shipping purposes.

1st Prize,	G. S. Clinnie & Sons, Listowel		6 00
2nd	do	C. Lewis, Salford	4 00

Best five Cheese boxes, for shipping purposes.

1st Prize,	Kalbfleisch & Schaefer, Tavistock		6 00

Best outfit for manufacturing Cheese.

Harford Ashley, Belleville ..... Diploma.

SWEEPSTAKES.

James Whitton, Wellmans' Corners ..... Gold Medal.

EXTRAS.

Silver Medal :—Outfit for manufacturing Butter, Champion Cabinet Creamer Company, Morrisburg.

Diploma :—Outfit for manufacturing Butter, John E. Hicks, Windsor Mills, Quebec, and William Russell, Guelph. Champion Creamer for large and small Dairies and Factories, John Packaberry, Alliston. Collection Dairy Utensils and Butter Shipping packages, Farm and Dairy Utensil Manufacturing Company, Brantford. Union Churn, Brandon Manufacturing Company, Toronto. Cheese Press, John Russell, Ingersoll, Butter Tubs for shipping purposes, Garnett & Galbraith, Bethany.

Highly Commended :—Outfit for manufacturing Butter, G. S. Clinnie & Sons, Listowel. Tumbling Churn, G. A. Conover, Credit.

CLASS XLII.

SUGAR, BACON, ETC.—25 ENTRIES.

JUDGES.—Ed. Roblin, Ameliasburg; Robert King, Barrie; A. Carson, Russell.

Best maple sugar, 15 lbs., cake,	William Mitchell, Waterloo	$3 00
2nd do	do Enoch Erb, Waterloo	2 00
3rd do	do Duncan Gillies, Moffatt	1 09
Best maple sugar, 15 lbs., stirred,	Enoch Erb, Waterloo	2 00
Best maple syrup, 1 gallon,	Mrs. A. Duffield, Eramosa	3 00
2nd do	Duncan Gillies, Moffatt	2 00
3rd do	William Mitchell, Waterloo	1 00
Best side of cured bacon,	E. J. Brill, Guelph	4 00
2nd do	E. W. Gollop, Norval	3 00
3rd do	Thomas B. Card, Marden	2 00
Best ham, cured,	E. J. Brill	3 00
2nd do	Conrad Biermann, Waterloo	2 00
3rd do	William Mitchell	1 00

CLASS XLIII.

HONEY AND APIARY SUPPLIES.—72 ENTRIES.

JUDGES.—J. H. Price, Welland; T. McIvers, Cobourg.

Largest and best display of extracted honey in marketable condition,	G. B. Jones, Brantford	$8 00
2nd do	do do do Noah Erb, Waterloo	4 00
Largest and best display of honey in the comb and in marketable condition,	G. B. Jones, Brantford	8 00
2nd do	do do do Mrs. W. Tolton, Eramosa	4 00
Best honey in comb, not less than 10 lbs.,	G. B. Jones	4 00
2nd do	do Thos. Beall, Lindsay	2 00
3rd do	do Thos. W. Taylor, Eden Mills	1 00
Best jar of extracted honey,	William McEvoy, Woodburn	3 00
2nd do	William C. Beatty, Omagh	2 00
3rd do	William C. Beatty, do	1 00
Best Bee Hive,	G. B. Jones	3 00
2nd do	H. Bailey, St. Thomas	2 00
Best wax-extractor,	G. B. Jones	Bronze Medal
Best honey-extractor,	G. B. Jones	Bronze Medal
Best and largest display of Apiarian supplies,	G. B. Jones	Silver Medal

CLASS XLIV.

DOMESTIC WINES.—35 ENTRIES.

JUDGES.—J. H. Price, Welland, T. McIvers, Cobourg.

Professional and Commercial List.

Best half-dozen dry wines..,	Toronto Wine Company, Toronto	$6 00
Best half-dozen sweet wines,	Toronto Wine Company	6 00
Best half-dozen sparkling wines,	Toronto Wine Company	6 00
2nd do	do J. L. Barre, Montreal, Q	4 00
Best half-dozen Canada claret,	Toronto Wine Company	6 00
Open to professional and Amateurs. Best assortment of wines made from grapes of Canadian growth,	Toronto Wine Company	Diploma.

General List. Professional and Commercial Winemakers excluded.

Best three bottles, dry wine, white,	J. D. Lutz, Stoney Creek	$16 00
2nd do	Henry Lutz, Stoney Creek	3 00
Best three bottles, dry wine, red,	Thomas McCullough, Eramosa	6 00
2nd do	J. D. Lutz	3 00
3rd do	Henry Lutz	2 00
Best three bottles, sweet wine, white,	Henry Lutz	4 00
2nd do	J. D. Lutz	2 00
Best three bottles, sparkling wine,	Thomas McCullough	4 00
Best three bottles, any other sort of grape wine,	Thomas McCullough	4 00
2nd do	do J. D. Lutz	2 00

EXTRAS.

Diploma.—J. L. Barre, Montreal, Que., Medoc Wine.

CLASS XLV.

FRUIT—PROFESSIONAL NURSERYMEN'S LIST. 36 ENTRIES.

JUDGES.—W. McKenzie Ross, Chatham; George Cairns, Virgil.

Best twenty varieties of apples, correctly named, five of each, A. M. Smith & Co., St. Catharines	$10 00
Best four varieties fall table apples, named, five of each, A. M. Smith & Co	3 00
Best six varieties of fall cooking apples, named, five of each, A. M. Smith & Co	3 00
Best six varieties of winter table apples, named, five of each, A. M. Smith & Co	3 00
Best six varieties of winter cooking apples, named, five of each, A. M. Smith & Co	3 00
Best fifteen varieties pears, correctly named, five of each, A. M. Smith & Co	10 00
Best six varieties do do A. M. Smith & Co	5 00
2nd do do John Holder, St. Catharines	3 00
Best ten varieties of peaches, correctly named, six of each, A. M. Smith & Co	6 00
Best twelve varieties of grapes, grown in open air, two bunches each, correctly named, John Holder	8 00
2nd do do do do A. M. Smith & Co.	6 00
Best four varieties of black grapes, grown in open air, two bunches each, correctly named, John Holder	3 00
2nd do do do do A. M. Smith & Co.	2 00
Best four varieties red grapes, grown in open air, two bunches each, correctly named, John Holder	3 00
2nd do do do do A. M. Smith & Co.	2 00
Best six varieties of grapes, grown under glass, one bunch of each sort, correctly named, William Vrooman, Oxford	8 00
2nd do do do do John Holder	6 00
Best three varieties grapes, three distinct colors, grown under glass, one bunch each, William Vrooman, Oxford	4 00
2nd do do do do John Holder	2 00
Heaviest 1 bunch black Hamburg grapes, grown under glass, John Holder	3 00
2nd do do William Vrooman	2 00
Heaviest 1 bunch black grapes, any other kind, grown under glass, William Vrooman	3 00
2nd do do do John Holder	2 00
Heaviest 1 bunch white grapes, grown under glass, William Vrooman	3 00
2nd do do John Holder	2 00
Display of fruit, the growth of exhibitor, not more than five specimens of each variety of apple and pear, named, grown under glass and in open air, A. M. Smith & Co.	15 00
Collection of one dozen each of 6 varieties of crabs, cultivated, A. M. Smith & Co.	3 00

Special Prize of one hundred dollars given by Stone & Wellington for the best sample of Polkington grapes, consisting of three clusters, Wm. Anderson, Hamilton.

CLASS XLVI.

FRUIT, GENERAL LIST, APPLES AND PEARS.—1460 ENTRIES.

JUDGES.—P. E. Bucke, Ottawa; C. M. Honsberger, Jordan; Benjamin Devitt, Waterloo.

Best twenty varieties apples, correctly named, five of each, J. D. Lutz, Stoney Creek	$10 00
2nd do do do J. B. Walker, Grimsby	8 00
3rd do do do R. Currie, Niagara	6 00
4th do do do Joseph Walker, Virgil	4 00
Best ten varieties of apples, correctly named, five of each, J. D. Lutz	6 00
2nd do do do James McCrone, Normandale	4 00
3rd do do do Harry Marshall, Hamilton	2 00
Best four varieties dessert apples, correctly named, five of each, R. Currie,	3 00
2nd do do do J. D. Lutz	2 00
3rd do do do George Cairns, Virgil	1 00
Best four varieties cooking apples, correctly named, five of each, J. D. Lutz	3 00
2nd do do do James McCrone	2 00
3rd do do do George Cairns	1 00
Best five Early Joe, Noah Sunley, Guelph	2 00
2nd do Harry Marshall	1 00
Best five Benoni, G. J. Miller, Virgil	2 00
Best five Hawley, Noah Sunley	2 00
2nd do W. M. Smith, Fairfield Plains	1 00
Best five Duchess of Oldenburg, George Cairns	2 00
2nd " Louis Kochler, Waterloo	1 00
Best five Snow apples, Charles Mason, Hamilton	2 50
2nd do J. D. Lutz	2 00
3rd do Edward Kendrew, Pond Mills	1 50
4th do E. C. Fearnside, Hamilton	1 00
Best five Fall pippins, Charles Mason	2 00
2nd do Thomas McCullough, Eramosa	1 00
Best five Gravenstein, J. D. Lutz	2 00
2nd do Henry Lutz	1 00
Best five Shiawassee Beauty, H. J. Brown, Niagara	2 00
2nd do G. J. Miller	1 00

Best five Maiden's blush,		William Anderson, Hamilton	$2 00
2nd	do	George Cairns	1 00
Best five Cayuga Red Streak,		J. D. Lutz	2 00
2nd	do	Mrs. John Young, Hamilton	1 00
Best five Mother,		G. J. Miller	2 00
2nd	do	Joseph Walker	1 00
Best five St. Lawrence,		Samuel J. Lyons, Norval	2 00
2nd	do	Mrs. John Young	1 00
Best five Colvert,		G. J. Miller	2 00
2nd	do	Charles Mason, Hamilton	1 00
Best five Porter,		Noah Sunley	2 00
2nd	do	H. J. Brown	1 00
Best five of any other variety fall apple, correctly named,			Edward Kendrew, Pond Mills	2 00
2nd	do	do	do	Conrad Biermann, Waterloo	1 00
Best five fall seedling apples,		G. J. Miller	2 00
2nd	do	J. D. Lutz	1 00
Best five Ribston Pippin,		Alex. Keath, Hamilton	2 00
2nd	do	Charles Mason do	1 00
Best five Alexander,		Mrs. H. Duffield, Eramosa	2 00
Best five Æsopus Spitzenburg,		James McCrone	2 00
2nd	do	J. B. Walker	1 00
Best five Baldwin,		J. B. Walker	2 50
2nd	do	Joseph Walker	2 00
3rd	do	James McCrone	1 50
4th	do	William Anderson, Hamilton	1 00
Best five Rhode Island Greening,		Charles Mason	2 50
2nd	do	J. D. Lutz	2 00
3rd	do	J. B. Walker	1 50
4th	do	Joseph Gordon, Hamilton	1 00
Best five Wagner,		G. J. Miller	2 00
2nd	do	Wm Smith	1 00
Best five Yellow Bellflower,		Charles Mason	2 00
2nd	do	J. D. Lutz	1 00
Best five King of Tompkins Co.,		H. J. Brown	2 00
2nd	do	James McCrone	1 00
Best five Talman's Sweet,		J. D. Lutz	2 00
2nd	do	Joseph Gordon	1 00
Best five Grimes' Golden,		Charles Mason	2 00
2nd	do	William Anderson	1 00
Best five Seek-no-Further,		Charles Mason	2 00
2nd	do	W. M. Smith	1 00
Best five Roxbury Russett,		R. Currie	2 50
2nd	do	George Cairns	2 00
3rd	do	G. J. Miller	1 50
4th	do	J. B. Walker	1 00
Best five Swaar,		James McCrone	2 00
2nd	do	Joseph Walker	1 00
Best five Fallawater,		J. D. Lutz	2 00
2nd	do	R. Currie	1 00
Best five American Golden Russett,		James McCrone	2 50
2nd	do	H. J. Brown	2 00
3rd	do	Charles Mason	1 50
4th	do	J. D. Lutz	1 00
Best five Swayzie Pomme Grise,		H. J. Brown	2 50
2nd	do	Joseph Walker	2 00
3rd	do	R. Currie, Hamilton	1 50
4th	do	Alexander Riach, Hamilton	1 00
Best five Pomme Grise,		Alexander Riach	2 00
2nd	do	George Cairns	1 00
Best five Northern Spy,		James McCrone	2 50
2nd	do	Samuel J. Lyons	2 00
3rd	do	Joseph Walker	1 50
4th	do	Joseph Atkinson, Marden	1 00
Best five Jonathan,		E. Fearnside	2 00
Best five Ben Davis,		W. M. Smith	2 00
2nd	do	J. B. Walker	1 00
Best five any other variety winter apple, correctly named,			J. D. Lutz	2 00
2nd	do	do	do	Alexander Riach	1 00
Best five Winter seedling apples,		J. B. Walker	2 00
2nd	do	James McCrone	1 00
Best twelve varieties of pears, 5 of each,		Charles Mason	10 00
2nd	do	Samuel Woodley	8 00
3rd	do	William Anderson	6 00
4th	do	D. Cameron, St. Catharines	4 00
Best six varieties of pears, 5 of each,		Charles Mason	4 00
2nd	do	Samuel Woodley	2 00
Best five Kirtland,		J. D. Lutz	2 00
2nd	do	Henry Lutz	1 00

Best five	Clapp's Favorite,	J. D. Lutz	$2 00
2nd do		Henry Lutz	1 00
Best five	Annas d'Ete,	Alexander Glass, St. Catharines	2 00
2nd do		R. Cameron, St. Catharines	1 00
Best five	Tyson,	Joseph Gordon, Hamilton	2 00
2nd do		Harry Marshall	1 00
Best five	Bartlets,	J. B. Walker	2 50
2nd do		J. D. Lutz	2 00
3rd do		Henry Lutz	1 50
4th do		Joseph Walker	1 00
Best five	Seckel,	Fred. B. Lewis, Lockport, N. Y	2 00
2nd do		Alexander Glass	1 00
Best five	Souvenir de Congress,	Samuel Woodley	2 00
2nd do		Noah Sunley	1 00
Best five	Louise Bonne de Jersey,	J. B. Walker	2 50
2nd do		Charles Mason	2 00
3rd do		Joseph Gordon	1 50
4th do		Edward Kendrew	1 00
Best five	Belle Lucrative,	Charles Mason	2 00
2nd do		J. B. Walker	1 00
Best five	Beurre Bosc,	Fred B. Lewis	2 00
2nd do		Joseph Walker	1 00
Best five	Beurre Hardy,	Samuel Woodley	2 50
2nd do		Joseph Gordon, Hamilton	2 00
3rd do		Fred B. Lewis, Lockport, N.Y	1 50
4th do		Mrs. John Young	1 00
Best five	Goodale,	Fred B. Lewis	2 00
2nd do		G. J. Miller, Virgil	1 00
Best five	Madelaine,	E. C. Fearnside, Hamilton	2 00
Best five	White Doyenne,	Fred B. Lewis	2 00
2nd do		E. C. Fearnside	1 00
Best five	Sheldon,	Fred B. Lewis	2 00
2nd do		J. B. Walker	1 00
Best five	General Negley,	Samuel Woodley	2 00
Best five	Flemish beauty,	William Anderson	2 50
2nd do		Joseph Walker	2 00
3rd do		J. B. Walker	1 50
4th do		W. J. Brown	1 00
Best five	Beurre Superfin,	Samuel Woodley	2 50
2nd do		Fred B. Lewis, Lockport, N.Y	2 00
3rd do		E. C. Fearnside	1 50
4th do		R. Cameron, St. Catharines	1 00
Best five	Beurre Diel,	William Anderson	2 00
2nd do		Mrs. John Young	1 00
Best five	Beurre d'Anjou	Alexander Glass	2 50
2nd do		Joseph Gordon	2 00
3rd do		W. J. Brown	1 50
4th do		Samuel Woodley	1 00
Best five	Beurre Clairgeau,	William Anderson	2 00
2nd do		Alexander Glass	1 00
Best five	Duchesse d'Angouleme,	J. B. Lewis	2 50
2nd do		Charles Mason	2 00
3rd do		Alexander Glass	1 50
4th do		J. D. Lutz	1 00
Best five	Doyenne Boussock,	J. D. Lutz	2 00
2nd do		R Currie	1 00
Best five	Grey Doyenne,	G. B. Lewis	2 00
2nd do		Mrs. John Young	1 00
Best five	Swan's Orange,	William Anderson	2 00
3nd do		Joseph Walker	1 00
Best five	Beurre de L'Assumption,	Samuel Woodley	2 00
2nd do		E. C. Fearnside	1 00
Best five of any other variety of fall pear, correctly named,		David Fraser, St. Catharines	2 00
2nd do		do Joseph Gordon	1 00
Best five	Seedling pears, fall,	Thos. McCullough	2 00
2nd do		Alexander Glass	1 00
Best five	Mount Vernon,	R. Cameron	2 00
Best five	Glout Morceau,	Samuel Woodley	2 00
2nd do		E. C. Fearnside	1 00
Best five	Beurre Gris' d'Hiver Noveau,	J. B. Lewis	2 00
2nd do		Alexander Glass	1 00
Best five	Winter Nelis,	J. B. Lewis	2 50
2nd do		Mrs. John Young	2 00
3rd do		Samuel Woodley	1 50
4th do		Alexander Glass	1 00
Best five	Vicar Winkfield,	Alexander Glass	2 00
2nd do		Mrs. John Young	1 00
Best five	Lawrence,	Alexander Glass	2 50

2nd Best five	Lawrence, R. Cameron		$2 00
3rd do	G. J. Miller		1 50
4th do	R. Currie		1 00
Best five of any other variety of Winter Pear, correctly named,	Charles Mason		2 00
2nd do	Samuel Woodley		1 00
Best five Seedling Pears, winter,	J. D. Lutz		2 00
2nd do	Joseph Walker		1 00

CLASS XLVII.

FRUIT, GENERAL LIST CONTINUED.—815 ENTRIES.

JUDGES.—D. W. Beadle, St. Catharines; George Leslie, jr., Toronto.

Best six varieties plums, green or yellow, correctly named, 6 of each,	E. C. Fearnside, Hamilton		$4 00
2nd do	do	Noah Sunley, Guelph	3 00
3rd do	do	William Davidson, Guelph	1 00
Best six varieties plums, red or blue, correctly named, six of each,	Noah Sunley		4 00
2nd do	do	E. C. Fearnside	3 00
3rd do	do	William Davidson	1 00
Best twelve	Bradshaw, E. C. Fearnside		2 00
2nd do	Noah Sunley		1 00
Best twelve	Lombard, Mrs. R. Ainlay, Guelph		2 00
2nd do	Thomas Holliday, Guelph		1 00
Best twelve	Victoria, Mrs. R. Ainlay		2 00
2nd do	Mrs. L. H. Taylor, Guelph		1 00
Best twelve	Huling's Superb, Mrs. R. Ainlay		2 00
2nd do	Noah Sunley		1 00
Best twelve	Coe's Golden Drop, William Davidson		2 00
2nd do	Noah Sunley		1 00
Best twelve	Yellow Egg-plums, Thomas McCullough		2 00
2nd do	Mrs. R. Ainlay		1 00
Best twelve	Imperial Gage, Mrs. R. Ainlay		2 00
2nd do	E. C. Fearnside		1 00
Best twelve	McLaughlin, George E. Elliott, Guelph		2 00
Best twelve	Pond's Seedling, Samuel Woodley		2 00
2nd do	Mrs. R. Ainley		1 00
Best twelve	Glass Seedling, Thomas Pallister, Guelph		2 00
2nd do	Mrs. R. Ainlay		1 00
Best twelve	Fellenburg, Noah Sunley		2 00
2nd do	Joseph Gordon		1 00
Best twelve	Lord Dufferin, Noah Sunley		2 00
Best twelve	Prince of Wales, Noah Sunley		2 00
Best twelve	Peach Plum, George Elliott		2 00
2nd do	Thos. Davies, Guelph		1 00
Best twelve	General Hand, A. A. Baker, Guelph		2 00
2nd do	George Elliott		1 00
Best twelve	Jefferson, R. Cameron		2 00
2nd do	Noah Sunley		1 00
Best twelve	Reine Claude de Bavay, Joseph Gordon		2 00
2nd do	E. C. Fearnside		1 00
Best twelve	Dessert plums, one variety, correctly named, Alexander Glass		2 00
2nd do	do	George Elliott	1 00
Best twelve	Cooking plums, one variety, correctly named, Mrs. R. Ainlay		2 00
2nd do	do	Noah Sunley	1 00
Best twelve	Seedling plums, E. C. Fearnside		2 00
2nd do	P. E. Bucke, Ottawa		1 00
Best six varieties	of peaches, correctly named, six of each, C. M. Honsberger, Jordan Station		4 00
2nd do	do	J. B. Walker	2 00
3rp do	do	Joseph Walker	1 00
Best six	Early Crawfords, Alexander Glass		2 00
2nd do	R. Cameron		1 00
Best six	Late Crawfords, George Cairns		2 00
2nd do	C. M. Honsberger		1 00
Best six peaches,	any other variety, correctly named, R. Currie		2 00
2nd do	do	Alexander Glass	1 00
Best six peaches,	white flesh, any other variety, correctly named, R. Currie		2 00
2nd do	do	Alexander Glass	1 00
Best six peaches,	yellow flesh, any other variety, correctly named, C. M. Honsberger		2 00
Best six seedling peaches,	yellow flesh, J. G. Davis, Hamilton		2 00
2nd do	H. J. Brown		1 00
Best six seedling peaches,	white flesh, H. J. Brown		2 00
2nd do	C. M. Honsberger		1 00
Best collection of grapes grown in open air,	twelve varieties, two bunches of each,	William Anderson	8 00
2nd do	do	Samuel Woodley	6 00
Best six varieties of grapes (open air),	two bunches of each,	Samuel Woodley	5 00
2nd do	do	F. B. Lewis, Lockport, N.Y.	3 00
3rd do	do	William B. Anderson	2 00

Best two bunches Concord grapes, Wm. Anderson				$2 00
2nd do	Samuel Woodley			1 00
Best two bunches Delaware, Fred. B. Lewis				2 00
2nd do	Samuel Woodley			1 00
Best two bunches Moore's Early, Wm. Anderson				2 00
Best two bunches Diana, Samuel Woodley				2 00
Best two bunches Creveling, Wm. Anderson				2 00
2nd do	Samuel Woodley			1 00
Best two bunches Rogers' 4, Wm. Anderson				2 00
2nd do	Alexander Glass			1 00
Best two bunches Rogers' 3, Samuel Woodley				2 00
2nd do	Wm. Anderson			1 00
Best two bunches Rogers' 15, Wm. Anderson				2 00
2nd do	Samuel Woodley			1 00
Best two bunches Rogers' 19, Wm. Anderson				2 00
2nd do	Samuel Woodley			1 00
Best two bunches Rogers' 44, Wm. Anderson				2 00
2nd do	Samuel Woodley			1 00
Best two bunches Salem, Wm. Anderson				2 00
2nd do	Samuel Woodley			1 00
Best two bunches Eumelan, Wm. Anderson				2 00
2nd do	Samuel Woodley			1 00
Best two bunches Hartford Prolific, Samuel Woodley				2 00
2nd do	R. Cameron			1 00
Best two bunches Iona, Wm. Anderson				2 00
2nd do	Samuel Woodley			1 00
Best two bunches Israella, Wm. Anderson				2 00
2nd do	Samuel Woodley			1 00
Best two bunches Allen's Hybrid, Wm. Anderson				2 00
Best two bunches Champion, Wm. Anderson				2 00
2nd do	Samuel Woodley			1 00
Best two bunches Pocklington, Wm. Anderson				2 00
2nd do	Samuel Woodley			1 00
Best two bunches Clinton, Wm. Anderson				2 00
Best two bunches Walter, Wm. Anderson				2 00
2nd do	Samuel Woodley			1 00
Best two bunches Martha, Wm. Anderson				2 00
2nd do	Samuel Woodley			1 00
Best two bunches of any other variety, Fred. B. Lewis				2 00
2nd do	Samuel Woodley			1 00
Best collection grapes, grown under glass, six varieties, one bunch each, correctly named,	Charles Mason			8 00
2nd do	do	do	Mrs. John Young	6 00
3rd do	do	do	R. Cameron	4 00
Best two bunches black Hamburg, Charles Mason				2 00
2nd do	Mrs. John Young			1 00
Best two bunches black grapes, any other variety, Charles Mason				3 00
2nd do	Mrs. John Young			2 00
Best two bunches red grapes, any other variety, Charles Mason				2 00
2nd do	Mrs. John Young			1 00
Best two bunches white grapes, grown under glass, correctly named,	Mrs. John Young			3 00
2nd do	do		Charles Mason	2 00
3rd do	do		R. Cameron	1 00
Best six quinces, J. B. Walker, Grimsby				2 00
2nd do	G. J. Miller, Virgil, Ont			1 00
Best green flesh melon, Alexander Riach, Hamilton				2 00
Best water-melon, Alex. Riach				2 00
Best citron, Alexander Riach				2 00
2nd do	Mrs. Samuel Barber, Guelph			1 00
Best four varieties cultivated crabs, twelve each, George Cairns				2 00
2nd do	do	E. C. Fearnside		1 00
Largest and best collection cultivated crabs, E. C. Fearnside				4 00
2nd do	do	Chas. Scott, Melville Cross		2 00
Best dried or evaporated apples, half bushel, J. S. H. Bartholomew, Vanessa, Ont				2 00

COLLECTIONS.

Apples.

Best collection of forty varieties, five of each, J. D. Lutz, Stony Creek			12 00
2nd do	do	A. M. Smith & Co., St. Catharines	8 00
3rd do	do	G. J. Miller, Virgil	6 00

Pears.

Best collection of twenty varieties, named, five of each, Samuel Woodley			10 00
2nd do	do	Charles Mason	8 00
3rd do	do	Fred. B. Lewis, Lockport, N. Y	5 00

PLUMS.

Best collection of twenty varieties, named, six of each,			Geo. Elliott, Guelph	$10 00
2nd	do	do	Owen Sound Horticultural Society, Owen Sound	8 00
3rd	do	do	Noah Sunley, Guelph	5 00

PEACHES.

Best collection of twelve varieties, named. six of each,			R. Currie	10 00
2nd	do	do	C. M. Honsberger	8 00
3rd	do	do	Grimsby Fruit Growers' Association	5 00

GRAPES—Grown in the open air.

Best collection of twenty varieties, named, two bunches of each,			Samuel Woodley	10 00
2nd	do	do	William Anderson	8 00
3rd	do	do	Fred. B. Lewis	5 00

EXTRAS.

Diploma:—Fig tree bearing fruit, John A. Peacock, Moffatt. Assortment evaporated fruit and vegetables, J. A. & H. Bartholomew, Vanessa.

CLASS XLVIII.

GARDEN VEGETABLES.—500 ENTRIES.

JUDGES.—John H. Griffith, London; Charles Bufton, Homer; Samuel Wood, Moulinette.

Best twelve roots of salsify,			Thomas O. Veale, Hamilton	$2 00
2nd	do		Conrad Biermann, Waterloo	1 00
Best three heads cauliflower,			Thomas Holliday, Guelph	2 00
2nd	do		Brock Cameron, Guelph	1 00
Best three heads of cabbage (early York),			Brock Cameron	2 00
2nd	do		Charles Scott, Melville Cross	1 00
Best three heads of cabbage (Winningstadt),			A. Frank, Berlin	2 00
2nd	do		Thomas Holliday	1 00
Best three heads cabbage (Oxheart),			Charles Scott	2 00
2nd	do		John Fielding, Guelph	1 00
Best three heads of cabbage (Drumhead),			Thomas Holliday	2 00
2nd	do		A. M. Taylor, Hamilton	1 00
Best four sorts winter cabbage, including savoys, 1 of each sort,			Charles Scott	3 00
2nd	do	do	Brock Cameron	2 00
Best three heads red cabbage,			A. W. Taylor	2 00
2nd	do		Brock Cameron	1 50
3rd	do		Thomas Holliday	1 00
Best twelve carrots for table, long red,			William Young, Orangeville	2 00
2nd	do		Robert Talbot, Everton	1 50
3rd	do		Louis Kochler, Waterloo	1 00
Best twelve intermediate or half long carrots,			Miss Janet C. Melvin, Guelph	2 00
2nd	do		William Young	1 50
3rd	do		David Foote, Elora	1 00
Best twelve early horn carrots,			Enoch Erb, Waterloo	2 00
2nd	do		Robert Talbot, Everton	1 50
3rd	do		George Cairns, Virgil	1 00
Best twelve table parsnips,			William T. Tolton, Arden	2 00
2nd	do		F. Sherwood	1 50
3rd	do		Robert Talbot	1 00
Best six roots, white celery,			Brock Cameron	2 00
2nd	do		William Young	1 50
3rd	do		Robert Brooks, Fergus	1 00
Best six roots red celery,			Charles Scott	2 00
2nd	do		William Young	1 50
3rd	do		Robert Brooks	1 00
Best dozen capsicums (ripe),			A. W. Taylor	2 00
2nd	do		Thomas Oliver Veale	1 50
Best collection of capsicums (ripe),			A. W. Taylor	2 00
2nd	do		Thos. O. Veale	1 50
Best three egg-plant fruit (purple),			R. Cameron	2 00
2nd	do		Alex. Glass	1 50
Best twelve tomatoes (Trophy),			George Cairns	2 00
2nd	do		E. C. Fearnside, Hamilton	1 50
Best twelve tomatoes (Gen. Grant),			George Cairns	2 00
2nd	do		E. C. Fearnside	1 50
Best twelve tomatoes (Cook's Favorite),			E. C. Fearnside	2 00
Best twelve Arlington tomatoes,			Geo. Cairns	2 00
2nd	do		E. C. Fearnside	1 00
Best twelve Conqueror tomatoes,			E. C. Fearnside	2 00
2nd	do		A. W. Taylor	1 00

Best twelve Dempsey's seedling, Geo. Cairns			$2 00
2nd	do	E. C. Fearnside	1 00
Best twelve tomatoes (large yellow), J. G. Davis, Hamilton			2 00
2nd	do	Thos. O. Veale	1 00
Best twelve any other variety tomatoes, George Cairns			2 00
2nd	do	A. W. Taylor	1 00
Best collection tomatoes, E. C. Fearnside			3 00
2nd	do	George Cairns	2 00
Best Six blood beets, long, Thos. Davies, Guelph			2 00
2nd	do	Geo. Cairns	1 50
3rd	do	George S. Armstrong, Fergus	1 00
Best six turnip rooted beets, W. H. Marcon, Guelph			2 00
2nd	do	Mrs. Agnew, Nassagaweya	1 50
3rd	do	David Caldwell, Galt	1 00
Best peck white onions, Thos. Pallisten, Guelph			2 00
2nd	do	Thomas Robinson, Guelph	1 50
3rd	do	Conrad Biermann	1 00
Best peck of yellow onions, Thomas Robinson			2 00
2nd	do	William Mitchell, Waterloo	1 50
3rd	do	Harry Marshall, Hamilton	1 00
Peck red onions, Conrad Biermann			2 00
2nd	do	Harry Marshall	1 50
3rd	do	Thomas Holliday	1 00
Best two quarts pickling onions, William Mann, Brantford			1 50
2nd	do	W. H. Marcon	1 00
Best twelve white turnips, (table), Louis Kochler			2 00
2nd	do	Conrad Biermann	1 50
3rd	do	John Brown, Alvia	1 00
Best twelve yellow turnips, (table), Louis Kochler			2 00
2nd	do	Charles Scott	1 50
3rd	do	Charles Foster, Millgrove	1 00
Best twelve ears of sweet corn, fit for the table, A. W. Taylor			2 00
2nd	do	William Mann	1 50
3rd	do	George Cairns	1 00
Best French beans, quart, J. G. Davis			2 00
2nd	do	Thomas O. Veale	1 00
Best six winter radish, A. W. Taylor			2 00
2nd	do	George Cairn	1 00
Best three Scotch kale, Charles Scott			2 00
2nd	do	Brock Cameron	1 00
Best collection of pot and sweet herbs, E. C. Fearnside			2 00
2nd	do	Charles Scott	1 00
Best six varieties of potatoes for garden cultivation, half peck of each sort, named, Enoch Erb			4 00
2nd	do	do Wm. Mitchell	3 00
3rd	do	do Wm. Mann	2 00
Best three varieties table squashes, Wm Mann			2 00
2nd	do	A. W. Taylor	1 50
3rd	do	Enoch Erb	1 00
Best two vegetable marrow, A. W. Taylor			2 00
2nd	do	William Mann	1 00
Best collection of vegetables (distinct from other entries), each kind named, A. Frank, Berlin			4 00

Highly Commended:—Top onions (small top sets), William P. Tolton, Arkell.

CLASS XLIX.

PLANTS AND FLOWERS. 256 ENTRIES.

JUDGES.—Thomas Holder, St. Catharines; Allen Glass, St. Catharines; James Grau, Mohawk; Edward Dale, Brampton.

PART 1.—*Cut Flowers.*

Best twelve varieties standard dahlias, named, one of each, George Anderson, Hamilton			$3 00
2nd	do	Webster Bros., Hamilton	1 50
Best twelve bouquet dahlias, named, one of each, Webster Bros., Hamilton			3 00
2nd	do	George Anderson, Hamilton	1 50
Largest and best collection of dahlias, named, one of each, Webster Bros., Hamilton			4 00
2nd	do	do George Anderson, Hamilton	3 00
Best two large vase bouquets, Charles Mason, Hamilton			4 00
2nd	do	W. M. Mann, Guelph	3 00
3rd	do	James B. Hay, Brantford	2 00
Best pair side table or fan bouquets, W. M. Mann			3 00
2nd	do	Charles Scott, Melville Cross	2 00
3rd	do	E. C. Fearnside, Hamilton	1 00

Best hand bouquet, W. M. Mann			$2 00
2nd	do	Webster Bros	1 50
3rd	do	Manton Bros., Yorkville	1 00
Best bouquets everlasting, J. G. Davies, Hamilton			2 00
2nd	do	Thos. Davies, Guelph	1 50
3rd	do	Thos. Oliver Veale, Hamilton	1 00
Best bouquet, wild flowers, Charles Mason			3 00
2nd	do	W. M. Smith, Fairfield Plains	2 00
3rd	do	Mrs. L. Parkinson, Eramosa	1 00
Best twelve pansies, Charles Scott, Melville Cross			2 00
2nd	do	Webster Bros	1 50
3rd	do	William Young, Orangeville	1 00
Best collection annuals, in bloom, named, John Brown, Elora			4 00
2nd	do	Thos. Davies, Guelph	3 00
3rd	do	Noah Sunley, Guelph, Ont	2 00
Best twelve German asters, Thomas Holliday			2 00
2nd	do	Webster Bros	1 50
3rd	do	Thomas Davies	1 00
Best collection of asters, Thomas Davies			3 00
2nd	do	Noah Sunley	2 00
3rd	do	Samuel J. Lyons, Norval	1 00
Best collection of 10-week stocks, Thomas Davies			2 00
2nd	do	Thomas Holliday	1 50
3rd	do	Mrs. L. Parkinson	1 00
Best collection of marigolds, Thomas O. Veale			2 00
2nd	do	George Anderson, Hamilton	1 50
3rd	do	Mrs. L. Parkinson	1 00
Best collection of hybrid perpetual and perpetual moss roses, named, Webster Bros			4 00
2nd	do	George Anderson	3 00
Best collection of Bourbon Tea and Noisette roses, named, Webster Bros			4 00
2nd	do	George Anderson	2 00
Best collection of hybrid tea roses, known as "Pedigree Roses," Webster Bros			4 00
Best three roses of any other variety, Manton Bros., Yorkville			3 00
2nd	do	James B. Hay, Brantford	2 00
3rd	do	Webster Bros	1 00
Best floral design for supper table, W. M. Mann			4 00
2nd	do	Mrs. G. Patterson	3 00
Best twelve verbenas, named, Charles Scott			2 00
2nd	do	William Young	1 50
3rd	do	Noah Sunley	1 00
Best collection verbenas, named, Charles Scott			3 00
2nd	do	William Young	2 00
3rd	do	Noah Sunley	1 00
Best six petunias, single, William Young			2 00
2nd	do	Noah Sunley	1 50
3rd	do	James B. Hay	1 00
Best six petunias, double, W. M. Mann			2 00
2nd	do	James B. Hay	1 50
3rd	do	Noah Sunley	1 00
Best collection Phlox Drummondii, Charles Scott			2 00
2nd	do	William Young	1 50
3rd	do	Thomas O. Veale	1 00
Best collection Dianthus, Thomas O. Veale			2 00
2nd	do	Webster Bros	1 50
3rd	do	Noah Sunley	1 00
Best collection perennial phloxes, Webster Bros			3 00
2nd	do	George Anderson	2 00
3rd	do	John Brown, Elora	1 00
Best ten hardy shrubs, to include variegated and otherwise remarkable foliage, spikes in flowers, Webster Bros			2 00
2nd	do	Charles Scott	1 50
Best collection hollyhocks, Webster Bros			2 00
2nd	do	Thomas O. Veale	1 50
3rd	do	George Anderson	1 00
Best collection of gladiolus, George Anderson			3 00
2nd	do	A. Frank, Berlin	2 00
Best collection of double zinnias, Thomas O. Veale			2 00
2nd	do	J. G. Davis	1 50
Best hanging baskets of flowers, W. M. Mann			2 00
2nd	do	Noah Sunley	1 50
Best collection of twenty-five greenhouse plants, John Brown			10 00
2nd	do	Mrs. G. Patterson	8 00
Best collection of twenty foliage plants, W. M. Mann			5 00
Best Cacti, ten species and varieties, James B. Hay			5 00
2nd	do	George Anderson	3 00
Best collection of Coleus, twenty varieties, Robert Brooks, Fergus			5 00
Best Collection of Begonias, ten varieties, George Anderson			5 00
2nd	do	Joshua Norrish, Eden Mills	3 00

Best six varieties fuschias, in flower,	Noah Sunley	$4 00
2nd do	Robert Brooks	3 00
3rd do	John Brown	2 00
Best six ferns, cultivated,	W. M. Mann	4 00
Best six ferns, native,	Noah Sunley	3 00
2nd do	Thomas P. Card, Marden	2 00
3rd do	Mrs. G. P. Patterson	1 00
Best six foliage plants,	W. M. Mann	3 00
2nd do	A. Frank, Berlin	2 00
3rd do	Noah Sunley	1 00
Best six cockscombs,	Noah Sunley	2 00
2nd do	Thomas Davies	1 50
Best six varieties balsams, in bloom,	Noah Sunley	2 00
2nd do	Charles Scott	1 50
Best twelve single geraniums in pots, named,	Noah Sunley	4 00
2nd do	Robert Brooks	3 00
Best six double geraniums, in pots,	Noah Sunley	3 00
2nd do	Robert Brooks	2 00
Best display of plants in flower, distinct from other entries,	W. M. Mann	10 00
2nd do	do. Noah Sunley	8 00
3rd do	do. A. Frank	4 00
Best collection of ferns,	W. M. Mann	3 00
Best rustic stand, not less than three feet high,	Edward Smith, per J. M Bond & Co., agents, Guelph.	4 00
Best rustic table design, not to exceed four feet in height,	Edward Smith, do do	4 00
Best collection of rustic work,	Edward Smith, per J. M. Bond & Co.	Diploma and 6 00

EXTRAS.

Highly Commended :—Pot of Ivy, Thomas Hefferman, Guelph.

ARTS AND MANUFACTURER'S DEPARTMENT.

CLASS L.

FINE ARTS, OILS.—188 ENTRIES.

Professional or Amateur—(Original).

JUDGES.—William Armstrong, Toronto; Captain J. G. Murray, Toronto; H. B. Spotton, Barrie.

Best animals from life,	Paul Peel, London	$10 00
Best flowers or fruit,	Miss M. E. Dignam, London	8 00
2nd do	John T. Corcoran, Galt	4 00
Best figure or historical subject,	Paul Peel, London	12 00
2nd do	Minnie Jarvis, Brantford	8 00
3rd do	Miss Sydney Tully, Toronto	4 00
Best landscape, Canadian subject,	J. Wilson, Ottawa	10 00
2nd do	R. Baigent, Toronto	6 00
Best landscape or marine painting, not Canadian subject,	William J. Judson, London	10 00
2nd do	do Paul Peel, London	6 00
Best portrait,	Mrs. Heaslip, Toronto	9 00
2nd do	Paul Peel, London	6 00
Best still life, not flowers or fruit,	Paul Peel, London	8 00
2nd do	John P. Hunt, London	4 00

Amateur List—Oils—(Copies).

Best any subject,	M. E. Dignam, London	8 00
2nd do	Stuart Livingstone, Hamilton	5 00
3rd do	Robert Crockett, Hamilton	3 00
Best animals from life,	M. E. Dignam, London	8 00
2nd do	Miss Tressy Coffee, Guelph	4 00
Best figure subject,	Miss Minnie Jarvis, Brantford	8 00
2nd do	M. E. Dignam, London	8 00
Best flowers or fruit,	M. E. Dignam, London	8 00
2nd do	Miss Strickland, Oshawa	4 00
Best landscape or marine view, Canadian subject,	M. E. Dignam, London	8 00
2nd do	do Miss Minnie Jarvis, Brantford	4 00
Best portrait,	M. E. Dignam, London	8 00
2nd do	Miss Jessie H. Williamson, Guelph	4 00
Best still life, not flowers or fruit,	Miss Emily M. Gunn, London	7 00

Extras.

Highly Commended :—Landscape, not Canadian (copy), amateur, Miss Laura Reynolds, Berlin.

Porcelain Decorations.

Best painting on porcelain, professional Canadian work, three pieces,	John H. Griffiths, London	$6 00
2nd do do do	Mrs. Heaslip, Toronto	4 00
Best collection of decorated porcelain, Canadian work, open to all,	John H. Griffiths, London	10 00
2nd do do do	Mrs. Heaslip, Toronto	6 00

CLASS LI.

FINE ARTS IN WATER COLORS, CRAYONS, ETC.—234 ENTRIES.

WATER COLORS.

Professional List—(Originals).

JUDGES.—William Armstrong Toronto; Capt. J. G. Murray, Toronto; H. B. Spotton, Barrie.

Best flowers or fruit,	William L. Judson, London	$5 00
2nd do	John H. Griffiths, London	3 00
Best landscape, Canadian subject,	William N. Creswell, Seaforth	6 07
2nd do	William L. Judson, London	4 00
Best landscape or marine view, not Canadian subject,	William N. Creswell, Seaforth	5 00
2nd do do	Miss H. Thurtell, Guelph	3 00
Best marine view, Canadian subject,	William N. Creswell	6 00

Amateur List—(Originals).

Best, any subject,	Mrs. E Chadwick, Guelph	6 00
2nd do	D. J. McMurchy, Toronto	3 00
Best animals from life,	Mrs. Florence Birle, Buffalo, N.Y.	5 00
Best flowers or fruit,	Miss A. L. Robinson, Toronto	5 00
2nd do	Miss L. C. S. Chadwick, Guelph	3 00
Best figure or historical subject,	Miss Sydney Tully, Toronto	5 00
2nd do	D. J. McMurchy, Toronto	3 00
Best landscape or marine view, Canadian subject,	Robert Crockett, Hamilton	6 00
2nd do do	D. J. McMurchy, Toronto	4 00

Amateur List—(Copies).

Best animals, grouped or single,	Mrs. Adam Cranston, Galt	4 00
2nd do	Stuart Livingstone, Hamilton	2 00
Best flowers or fruit,	Miss Francis McNaught, Galt	4 00
2nd do do do		2 00
Best figure or historical subject,	Miss Emily M. Gunn, London	4 00
2nd do	Miss Machelcudy, Toronto	2 00
Best landscape,	Miss J. Cochrane, Toronto	4 00
2nd do	Robert Crockett, Hamilton	2 00
Best marine view,	D. J. McMurchy, Toronto	4 00
2nd do	Miss. Strickland, Oshawa	2 00
Best still life, not flowers or fruit,	Miss J. Cochrane, Toronto	4 00
2nd do	D. J. McMurchy, Toronto	2 00

CRAYON, PENCIL, SEPIA, AND PEN AND INK SKETCH.

Professional List—(Originals).

Best Crayon, plain,	Richard Baigent, Toronto	4 00
2nd do	S. Wilson, Ottawa	2 00
Best pen and ink sketch,	William N. Creswell, Seaforth	4 00
Best pencil drawing,	William N. Creswell	4 00
Best sepia drawing,	William N. Creswell	4 00

Amateur List—(Copies).

Best crayon, coloured,	Archibald Simpson, Hamilton	$4 00
2nd do	Janet C. Melvin, Guelph	2 00
Best crayon, plain,	Miss B. Knight, Woodstock	4 00
2nd do	Miss Minnie McBean, Mount Forest	2 00
Best pen and ink sketch,	Mrs. A. Cranston, Galt	4 00
2nd do	D. J. McMurchy, Toronto	2 00
Best pencil drawing,	Miss Strickland, Oshawa	4 00
2nd do	Mrs. T. Ware, Guelph	2 00
Best sephia,	D. J. McMurchy, Toronto	4 00
2nd do	John J. Biggins, Clinton	2 00

EXTRA ENTRIES.

Diploma.—Picture, Clement T. Read, Guelph.

Highly Commended.—Lithograph finished in water colours, Chas. S. Cochrane, Toronto; pen and ink sketch, Joseph Cowdy, Eramosa.

PENMANSHIP, LINEAR DRAWING, PHOTOGRAPHING, ENGRAVING, MAPS, STATUARY, ETC.

CLASS LII.

Penmanship, Geometrical.

ARCHITECTURAL AND MECHANICAL DRAWINGS, ENGRAVINGS, LITHOGRAPHY, ETC.—46 ENTRIES.

JUDGES.—William Armstrong, Toronto; Captain J. G. Murray, Toronto; H. B. Spotton, Barrie.

Best drawing, geometrical, of engine or mill work, coloured, Mrs. A. Cranston, Galt	$4 00
Best penmanship, business hand, without flourishes, D. McLachlin, Chatham	4 00
2nd do do do C. A Fleming, Owen Sound	2 00
Best penmanship, ornamental (not pen and ink pictures), C. A. Fleming, Owen Sound	4 00
2nd do do do D. McLachlin, Chatham	2 00
Best photograph portrait, finished in oil, Mrs. Florence Birle, Buffalo, N.Y.	6 00
2nd do do S. Carswell, Palmerston	4 00
Best photograph portrait, finished in water colours, S. Carswell, Palmerston	5 00

Statuary, etc., Professional or Amateur.

Best carving in wood, E. J. O'Brien, Guelph	$8 00
Best carving in stone, in relief, John H. Hamilton, Guelph	8 00
Best model in clay or wax, with plaster case, Pane Peel, London	8 00
Best statute or group, in stone, John H. Hamilton, Guelph	15 00
2nd do do Charles Southcott, Guelph	10 00

EXTRAS.

Diploma.—Collection of Wagstaff's rapid index books, John Wagstaff, St. John, N.B.; Glacies window decoration, imitation stained glass, M. Staunton & Co., Toronto; specimen of marbling for book edges, John Faucett, Toronto; transfer photograph, painted in oils, Mrs. O. Hitchcock, Paris; penmanship, ornamental, J. Kordans & Co., Toronto.

Highly Commended.—Statue or group, in stone, James Barrett, Guelph.

CLASS LIII.

NATURAL HISTORY AND MINERALOGY.—ENTRIES.

JUDGES.—William Saunders, London; P. R. Palmer, Belleville.

Birds.—Best collection of native, stuffed, with common and technical names attached and classified, James Anderson, Guelph	$10 00
2nd do do do do Frederick Shertyberg, Brantford	6 00
Best collection of living ornamental fishes, C. B. Haynes, Guelph	3 00
2nd do do do S. Freeman, Racine, Wis., per J. M. Bond & Co., Agents, Guelph	2 00
Fossils.—Best collection of Canadian, named and classified, Elora School Museum	6 00
2nd do do do do J. Townsend, Durham	4 00
Plants.—Best Collection of native, arranged in their natural families and named, Elora School Museum	8 00
2nd do do do Mrs. R. D. Parker, Guelph	4 00
Best stuffed animals of any country, collection of, Thomas Richardson, Alma	8 00
2nd do do do Frederick Shertyberg, Brantford	4 00
Best stuffed birds of any country, collection of, T. Gibbs, Guelph	6 00
2nd do do do Frederick Shertyberg, Brantford	4 00
Best fish aquaria, C. B. Hayes, Guelph	8 00
2nd do J. Freeman & Sons, Racine, Wis., per J. M. Bond & Co., Agents, Guelph	4 00
3rd do Oakes Manufacturing Co., Boston, Mass., U. S., per J. M. Bond & Co., Agents, Guelph	2 00

MINERALOGY, ETC.

Each specimen must be labelled, giving name of specimen and where found.

Clays, Canadian, for paints, best 50 lbs., J. Newton, Limehouse, per J. M. Bond & Co., Agents, Guelph	$5 00
Copper ores of Dominion, best collection, Elora School Museum	8 00
Iron ores of the Dominion, best collection of, Elora School Museum	8 00
Lead ores of Dominion, best collection of Elora School Museum	8 00
Silver ores of the Dominion, best collection of, Elora School Museum	8 00
Specimens, illustrating the mineralogy of Canada, best collection of, Elora School Museum	15 00

EXTRAS.

Silver Medal :—Archæological collection of Indian Relics, and collection of ancient European articles from different parts of Canada, C. A. Herschfelder, Toronto.

Diploma :—Rock gypsum and land plaster prepared for market, Gill, Allan & Co., Paris. Rock gypsum and land plaster prepared for market, Grand River Plaster Co., Toronto. Collection of minerals, etc., Elora School Museum.

NOTE BY THE JUDGES.—The Ontario Government exhibit of minerals of north-western Ontario, which are not shewn for competition, but the exhibit has so many features of excellence that we suggest that it receive honourable mention by the Council.

Highly Commended :—Plants, collection of native, Mr. Samuel Barber, Guelph.

CLASS LIV.

537 ENTRIES.

JUDGES.—Mrs. Mary J. McKibbon, Peterboro'; Mrs. Margaret L. Miller, Galt.

Best painting on china, Miss A. L. Robinson, Toronto	$3 00
2nd do Miss Caldwell, Galt	2 00
Best painting on Terra Cotta, Miss A. L. Robinson, Toronto	3 00
2nd do do Miss Caldwell, Galt	2 00
Best painting on silk or satin, water colours, Miss Hattie Holliday, Guelph	3 00
2nd do do do Laura Reynolds, Berlin	2 00
Best painting on silk or satin, oils, M. E. Dignam, London	3 00
2nd do do do Mrs. Heaslip, Toronto	2 00
Best painting on wedgewood ware, Mrs. Heaslip, Toronto	3 00
2nd do do Mrs. T. C. Dean, Parkhill	2 00
Best painting on plush, Miss A. L. Robinson, Toronto	3 00
2nd do do Emma M. Gunn, London	2 00
Best painting on velvet, Mrs. R. Ainlay, Guelph	3 00
2nd do do Miss L. Foster, Guelph	2 00
Best painting on glass, Miss Lizzie Foster, Guelph	3 00
2nd do A. M. Murray, Brampton	2 00
Best painting on jars, Miss Francis McNaught, Galt	3 00
2nd do Miss A. L. Robinson, Toronto	2 00
Best fancy work (any kind), by girls under twelve years of age, Justina A Harrison, Toronto	2 00
2nd do do do do do do Maria Meredith, Guelph	1 50
Best Applique work, Miss McVean, Woodhill	3 00
2nd do Miss Anna Aldons, Eramosa	2 00
Best oriental embroidery (in silk), Mary Machilcudy, Toronto	3 00
2nd do do Mrs Susan Rowdon, Brampton	2 00
Best ladies' bonnets, collection of, Mrs. Pass, Guelph	5 00
Best hair dressers' work, Mrs. Pass, Guelph	3 00
Best hair jewellery, Miss Bessie Duffield, Eramosa	3 00
Best plaits for bonnets or hats, Canadian straw, Mary Machilcudy, Toronto	2 00
2nd do do do Miss J. H. Tolton, Eramosa	1 50
Best crewel work (wool), Miss McVean, Woodhill	2 00
2nd do Lizzie Foster, Guelph	1 00
Best tinsel work, Mrs. R. A. Harrison, Toronto	3 00
2nd do Mrs. Alexander McGregor, Galt	2 00
Best arresine work, Mrs. J. Soper, Guelph	3 00
2nd do Mrs. John Tomson, Fergus	2 00
Best Berlin wool work for framing, Mrs. Susan Rowdon, Brampton	4 00
2nd do do J. Maitland, Ponsonby	3 00
Berlin wool work, raised, Misses J. & H. Tolton, Eramosa	4 00
2nd do Miss McVean, Woodhill	3 00
Best slippers, pair, worsted work, Mrs. J. Barnum, Grafton	3 00
2nd do do Mrs. William Garnham, Guelph	2 00
Best sofa cushion, Mrs. R. A. Harrison, Toronto	3 00
2nd do Mrs. Johns, Guelph	2 00
Best netting, fancy, Maggie Pritchard, Fergus	3 00
2nd do Mrs. John Tomson, Fergus	2 00
Best mats, wool, Mrs. T. Ware, Guelph	3 00
2nd do Mrs. S. Mason, Hornby	2 00
Best teapot cosey, Lizzie Foster, Guelph	3 00
2nd do Miss Duguid, Guelph	2 00
Best chenille work, Mrs. A. Cranston, Galt	3 00
2nd do Mrs. Alex. McGregor, Galt	2 00
Best bead work, Edlth Chisholm, Guelph	3 00
2nd do S. J. Maitland, Ponsonby	2 00
Best carriage or sofa afghan, Miss Duguid, Guelph	4 00
2nd do do E. A. Penniman, Homesdale	3 00
Best crotchet work (fancy wool), Mrs. T. Drummond, Kingston	3 00
2nd do do Miss McCrae, Guelph	2 00

Best braiding, Mrs. Peter Bathgate, Eramosa	$3 00
2nd Mrs. John Tomson, Fergus	2 00
Best stamping work, Lizzie Foster, Guelph	3 00
2nd do Mrs. W. S. Armstrong, Speedside	2 00
Best embroidery on cotton or muslin, Mrs. Henderson, Egmondville	3 00
2nd do do Mrs. Susan Howdon, Brampton	2 00
Best embroidery on silk or cloth, Mary Machilcudy, Toronto	3 00
2nd do do Miss Duguid, Guelph	2 00
Best embroidery on flannel, Miss McVean, Woodville	3 00
2nd do do Mrs. Thomas Smyth, Tormore	2 00
Best guipure work, Susan Howdon, Brampton	3 00
2nd do Mary Strickland, Oshawa	2 00
Best tatting, Miss Katie Smith, Toronto	3 00
2nd Mrs. De Wynton, Grafton	1 00
Best lace (point), Hattie Holliday, Guelph	3 00
2nd do Mrs. H. Vincent, Guelph	2 00
Best lace (honiton), Mrs. J. H. Spencer, Springford	3 00
2nd do Susan Howdon, Brampton	2 00
Best lace (pillow or bobbin), Miss McVean, Woodhill	3 00
Best lace (macrame or twine), Miss Caldwell, Galt	3 00
2nd do Francis McNaught, Galt	2 00
Best wax flowers (coloured), Mrs. S. Moffatt, Guelph	3 00
2nd do Mrs. Johns, Guelph	2 00
Best wax flowers, or design (white), Mrs. W. Kennedy, Toronto	3 00
2nd do do Lizzie Foster, Guelph	1 00
Best wax work (autumnal leaves), Mrs. W. Kennedy, Toronto	3 00
2nd do do Myrtilla Smith, Fairfield Plains	2 00
Best ornamental leather work, Mrs. T. L. Dean, Parkhill	3 00
2nd do do Miss May F. Munson, Branchton	2 00
Best collection of berlin wool work—the work of one person, Maggie Pritchard, Fergus	Diploma
Best collection of wax work—the work of one person, Mrs. W. Kennedy	Diploma
Best and greatest collection of ladies' work, ornamental—the work of one person, Mrs. R. A. Harrison, Toronto	Silver Medal

EXTRAS.

Highly Commended.—Pillow Shams, Mrs. John S. Webb, Everton. Feather Flowers, Mrs. J. Henderson, Egmondville. Feather Flowers, Mrs. George Dickison, Eramosa. Mantel Drape crocheted in twine, Tidy on Java canvas, in filosel, Toilet Set, Berlin wool on oatmeal cloth, Miss Essie Tanner, Guelph. Knitted Cotton Tidy, with shell borders, Mrs. L. C. Dean, Parkhill. Extra Outline work, Mrs. Alex. Macgregor, Galt. Plain Berlin wool work, Mrs. T. Ware. Kensington Embroidery on satin, Miss Thompson, Georgetown. Mosaic work, Miss L. Foster, Guelph Fine Fancy Kuitting, Mrs. J. Henderson, Egmondville. Embroidery on Satin, Miss K. A. Matthews, Toronto. Embroidery on Leather, Mrs. Parker, Guelph. Extra Prize—Crewel woak on Silk, Mrs. Godard, Toronto. Mirror, painted in oils, original, Miss J. Cochrane, Toronto. Man's Straw Hat, Enoch Eob, Waterloo. Hair Flowers and Feather Flowers, Jennie Conley, Guelph. Crochet Mat, cotton and beads, Mrs. De Wynton, Grafton.

CLASS LV.

LADIES' WORK—USEFUL.—340 ENTRIES.

JUDGES.—Mrs. E. J. Ritchey, Barrie; Mrs. J. B. Aylesworth, Newburgh.

Best machine-sewing (family), Mrs. J. Bennett, Guelph	$3 00
2nd do Miss Strickland, Oshawa	2 00
Best hand-sewing, Miss Ann Pringle, Teeswater	3 00
2nd do Mrs. G. J. Rittenham, Preston	2 00
Best shirt, man's fine, unwashed, hand-made, Mrs. A. Cranston, Galt	3 00
2nd do Miss Annie Pringle, Teeswater	2 00
Best shirt, man's fine, unwashed, machine-made, Miss Strickland, Oshawa	3 00
2nd do Mrs. T. Smyth, Tormore	2 00
Best shirt, man's coarse, unwashed, hand-made, Mrs. James Liddle, Dundas	2 00
2nd do Miss Ada Parkinson, Eramosa	1 00
Best shirt, man's flannel, hand-made, Miss McVean, Woodhill	2 00
2nd do Mrs. William Cockburn, Aberfoyle	1 00
Best plain sewing, by girl under twelve years, Miss Barber, Guelph	2 00
2nd do Maggie J. Armstrong, Speedside	1 00
Best darning specimen on stockings, Mary Machilcudy, Toronto	2 00
2nd do Mrs. Susan Rowdon, Brampton	1 00
Best counterpane, crochet, Maggie Cowie, Elora	4 00
2nd do Mrs. Joshua Norrish, Eden Mills	3 00
Best counterpane, knitted, Susan Rowdon, Brampton	4 00
2nd do Maggie Cowie, Elora	3 00
Best quilt, patchwork, calico, Eliza Cox, Guelph	3 00
2nd do Mrs. Godard, Toronto	2 00
Best quilt, patchwork, cloth	
2nd do Mrs. Johns, Guelph	2 00

Best quilt, patchwork, silk, Mrs. Chellas, Toronto	$3 00
2nd do Miss B. Duffield, Eramosa	2 00
Best quilt, white, quilted, John S. Webb, Everton	3 00
2nd do Mrs. Charles Scott, Melville Cross	2 00
Best quilt, log cabin, Miss Bella Duncan, Elora	3 00
2nd do Mrs. Peter Bathgate, Eramosa	2 00
Best gloves, two pairs, coarse, hand-made, Christina McIntyre, Morristown	2 00
2nd do Mrs. W. Mutrie, Oustic	1 50
Best gloves, two pairs, fine. hand-made, Christina McIntyre, Morristown	2 00
Best mitts, two pairs, coarse, hand-made, Duncan Gillies, Moffatt	2 00
2nd do Christina McIntyre, Morristown	1 50
Best mitts, two pairs, fine, hand-made, Mrs. Wm. Kitching, Rockwood	2 00
2nd do Jeanie A. Wyllie, Streetsville	1 50
Best knitted stockings, two pairs, wool, hand-made, Mrs. T. Drummond, Kingston	3 00
2nd do Mrs. John McGill, Eramosa	2 00
Best knitted socks, two pairs, wool, hand-made, Mrs. Wm. Kitching, Rockwood	2 00
2nd do Miss Lucy Smith, Toronto	1 50
Best stockings or socks, two pairs, knitted by girl under twelve years, Miss Brownlee, Gorrie	3 00
Best stockings, two pairs, fancy cotton. hand-made, Mrs. C. W. Hellens, St. Catharines	3 00
2nd do Mrs. T. C. Deane, Parkhill	2 00
Best knitted shirt, man's hand-made, Mary Strickland, Oshawa	3 00
Best knitting, fancy wool, Miss Strickland, Oshawa	3 00
2nd do Mrs. C. W. Hellens, St. Catharines	2 00
Best knitted drawers, man's hand-made, Mrs. John Carr, Sarnia	3 00
2nd do Mrs. Andrew Mutrie, Oustic	2 00
Best tidy, crochet cotton, Mrs. S. J. Maitland, Ponsonby	2 00
2nd do Mrs. T. Ware, Guelph	1 00
Best darned net, Susan Rowdon, Brampton	2 00
2nd do Mary Strickland, Oshawa	1 00
Best collection of knitting, Mrs. George Watson, Rockwood	Diploma
Best collection of crochet, Miss Brownlee, Gorrie	Diploma
Best lambrequin, Mrs. R. A. Harrison, Toronto	2 00
Best table valance, Miss Essie Tanner, Guelph	2 00
2nd do Misses J. & S. Tolton, Eramosa	1 00
Best fancy screens, pasted pictures, Carrie Stephenson, Guelph	2 00
Best and greatest collection of ladies' work, useful, the work of one person, Mrs. Dr. Brownlee, Gorrie	Silver Medal

EXTRAS.

Highly Commended.—Golding Embroidery, Susan Rowden, Brampton. Pin-cushion, Agnes F. Rodger, Guelph. Woollen Tidies, Ada Robinson, Eramosa. Knitted, white counterpane, Samuel J. Lyons, Norval. Bedroom Set, Darned Net, Robert Hadden, Guelph. Counterpane, made by hand, Mrs. J. Smith, Guelph. Table Spread, James Webb, Ospringe. Knitted Edging and Crochet Edging, Jeanie Cooley, Guelph. Work, A. M. Murray, Brampton. Table Scarf, Mrs. T. Soper, Guelph.

CLASS LVI.

CHEMICAL MANUFACTURES AND PREPARATIONS.—30 ENTRIES.

JUDGES.—William Saunders, London ; P. R. Palmer, Belleville.

Best collection of fancy soaps, T. W. Nichols, Toronto	$4 00
Best collection common soap, James Walker, Hamilton	4 00
Best medicinal herbs, roots and plants, native growth, William T. Tolton, Arkell	6 00
2nd do do Mrs. Samuel Barber, Guelph	4 00
Best oils—linseed, J. & J. Livingtone, Baden, per J. M. Bond & Co., Agts	6 00
2nd do Ramsay, Dodds & Co., Montreal, per J. M. Bond & Co., Agts	4 00
Best oils—Neat's foot. half gallon, Queen City Oil Company, Toronto	2 00
2nd do Mrs. Samuel Barber, Guelph	1 00
Best oils—paraffine, Queen City Oil Co., Toronto	6 00
Best Petroleum, refined, half gallon, Queen City Oil Co., Toronto	4 00
Best assortment of perfumes, G. C. Briggs & Sons, Hamilton	4 00
Finest display of petroleum products exhibited by one person or firm, Queen City Oil Co., Toronto	Gold Medal

Note by the Judges.—This display of petroleum products is unusually fine, has been got up at great expense to the exhibiters, and is a very striking feature in the building. We would recommend that in this instance, a gold medal be substituted for a bronze one.

Diplomas.—Packages Dyes, in show cases, samples colored therewith, Wilson Chemical Co., Kingston. Thorley's Improved Horse and Cattle Food, Thorley Horse and Cattle Food Co. Horse and Cattle Food, London Feed Co., London. Horse and Cattle Food, Empire Horse and Cattle Food Co., Mitchell. Climax Cattle Food, Climax Poultry Foods, London Feed Co.

Highly commended. Star Cement, Harness Dressing, G. C. Briggs & Sons, Hamilton. Almond Soap Candles, James Walker, Hamilton.

CLASS LVIII.

BUILDING MATERIALS, PAINTING, WORK IN MARBLE, ETC.—20 ENTRIES

JUDGES.—Benjamin Mills, Paisley; J. M. Green, St. Thomas.

Best decorative house painting, W. T. Croft, Guelph	$6 00
Best granite, Canadian, polished specimens, John H. Hamilton, Guelph	6 00
Best monument of Canadian granite, John H. Hamilton, Guelph	5 00
Best monumental headstone, Thomson & Cumming, Fergus	6 00
Best sign painting, W. F. Croft, Guelph	5 00
2nd do do do	3 00
Best stained glass, collection of specimens, Ramsy, Dodds & Co., Montreal, per J. W. Bond & Co., agts.	8 00

EXTRAS.

Highly Commended:—Figures in marble, James Barrett, Guelph

CLASS LIX.

CABINET WARE AND OTHER WOOD AND HAIR MANUFACTURES.—70 ENTRIES.

JUDGES.—John Hogg, Paisley; James Wark, Westmeath.

Best carving in wood, decorative, not connected with any other article on exhibition, E. J. D. Brien, Guelph	$6 00
Note by the judges—We strongly recommend this carving as being the best we have ever seen.	
Best centre table, Fred. Kremer, Preston	6 00
Best chair, easy, for invalids, G. S. Aspinall & Co., Galt	4 00
2nd do National Mfg. Co., Ottawa	2 00
Best scroll and fretwork, G. J. Brill, Guelph	4 00
2nd do Master J. H. Spencer, Springford	2 00
School furniture, an assortment, W. Stahleschmidt, Preston	8 00
Best assortment and display of manufactured wood goods, suitable for house, ship and steamboat furnishing, viz:—Doors, window sash and window blinds, of all descriptions; mouldings, beads, architrave, flooring, tongued and grooved, veneerings of all kinds of Canadian woods, display of wooden wares of all descriptions, such as tubs, pails, washing-boards, clothes-pins, &c., &c., &c. All to be without paint or varnish, Robert Stewart, Guelph	Diploma
Best clothes-wringer, B. Walton, Listowel	2 00
2nd do A. B. & H. Dowell, London	1 00
Best washing machine, William Russell, Guelph	3 00
2nd do John Wilkins & Co., Toronto	1 00
Best brushes, hair, assortment of, Charles Boeck & Son, Toronto, per J. W. Bond & Co., Agents	6 00
2nd do Joseph Baltzer, Preston	4 00
Best brushes for manufacturing, Charles Boeck & Son, per J. W. Bond & Co	6 00
Best corn brooms, 1 doz., R. S. Hamilton, Norval	2 00
Best turning in wood, collection of specimens, C. Lewis, Salford	6 00
2nd do S. P. Morgan, Kerrwood	3 00
Best turned hollow wooden-ware, assortment of, C. Lewis, Salford	6 00
2nd do E. P. Morgan, Kerrwood	3 00
Best wash-tubs and pails, factory made, 3 of each, C. Lewis, Salford	4 00

EXTRAS.

Gold Medal:—Assortment of Tents, Marquees and Camp furniture, National Manufacturing Co., Ottawa

Silver Medal:—Assortment Flags, Sporting Tents, Verandah and Extension Chairs, Lawn Canopies, Combined Bed and Tent, Mosquito Nets, Camp Stools, &c., National Manufacturfng Co., Ottawa.

Highly Commended:—Patent Spring Lever Swing, Charles Watkins, Woodstock. Solace Recline Camp Stools and Hammocks, T. S. Aspinall & Co., Galt. Forty-two samples of Canadian Woods, Peter Hunter, Guelph, Centre Ottoman, Miss Margaret Brown, Guelph. Bed Bottom, Carpet Whipper and Folding Board, Weldermuth Spring Bed Co., Gananoque.

Extra Prize:—$4 00, awarded for Cylinder Bureau, Centre Table, and Ladies' Sewing Table, Fred. Kremer, Preston.

MACHINERY AND PARTS THEREOF AND TOOLS.

CLASS LX.

STEAM ENGINES—HYDRAULIC MACHINERY.—100 ENTRIES.

JUDGES.—N. Bristoe, Hawley; H. Crawford, Canboro'; George McMillan.

Best portable steam engine for agricultural purposes, not less than six horse power, to be put in operation on the ground, John Abell, Woodbridge, for 1st and 2nd prize, per Wm. O'Connor, Agent, Guelph	Gold Medal
3rd do Macdonald, Macpherson & Co., Stratford	$10 00

Best fire escape, Wm. Russell, Guelph $6 00
Best fountain, Olmstead & Son, Hamilton, per J. W. Bond & Co., Agents, Guelph 6 00
Best pumps, metal, for wells or cisterns, assortment, H. E. Bush, Hamilton, per J. W. Bond & Co., Agents, Guelph 6 00
2nd do R. McDougall & Co., Galt, per J. W. Bond & Co., Agents, Guelph. 4 00
Best pump, double-acting, lift or force, H. E. Bush, Hamilton, per J. W. Bond & Co., Agents, Guelph. 4 00
2nd do Farm & Dairy Utensil Manufacturing Co., Brantford 2 00
Best pump, force, for hand use, H. E. Bush, Hamilton, per J. W. Bond & Co., Agents, Guelph 4 00
2nd do Farm & Dairy Utensil Manufacturing Co., Brantford 2 00
Best windmill, in operation, R. McDougall & Co., Galt, per J. W. Bond & Co., Agents, Guelph 6 00
2nd do Ontario Pump Co., Toronto 4 00

EXTRAS.

Highly Commended :— Horse Power Fire Engine, John Abell, Woodbridge. Traction, or Road Engine, Waterous Engine Co., Brantford.

METAL WORKING MACHINERY, AND MACHINISTS' TOOLS, &C.

Best blacksmith's tools, assortment, A. B. Jardine & Co., Hespeler $4 00
2nd do J. G. Bricker, Waterloo 2 00
Best chopping axes, 1 dozen, The Welland Vale Manufacturing Co., St. Catharines, per J. W. Bond & Co., Agents 4 00
Best drills, taps, dies and rimmers, assortment of, Butterfield & Co., Rock Island, Que 4 00
2nd do A. B. Jardine & Co., Hespeler 2 00
Best edge tools, largest and best assortment, The Weland Vale Manufacturing Co., St. Catharines, per J. W. Bond & Co., Agents 15 00
Best emery wheels, assortment, Hart Emery Wheel Co., Hamilton, per J. W. Bond & Co., Agents. 4 00
Best emery grinding machine, do do do do 6 00
Best files, an assortment of, T. Graham & Co., Toronto, per J. W. Bond & Co., Agents, Guelph 4 00
Machinists' tools for working in metals, best and largest display, J. G. Bricker, Waterloo 10 00
Best picks and mattocks, The Welland Vale Manufacturing Co., St Catharines, per J. W. Bond & Co., Agents, Guelph 4 00
2nd do Ontario Car Manufacturing Co., London 2 00
Best radial driller, A. B. Jardine & Co., Hespeler 6 00
2nd do J. G. Bricker, Waterloo 4 00
Best saws, circular, assortment, Shurley & Diepich, Galt, per J. W. Bond & Co., Agents, Guelph .. 6 00
Best saws, hand, including crosscut, do do do do 4 00
Collection of iron working machinery, A. B. Jardine, Hespeler ..... Diploma and 6 00

EXTRAS.

Highly Commended:—Bolt Cutter, for threading nuts and bolts, Tolton Bros., Guelph. Self-adjustable Wrench, Albert Hoener. File Upsetter, A. B. Jardine, Hespeler.

Best boring machine for wood, J. G. Bricker, Waterloo ..... — $6 00

EXTRAS.

Highly Commended:—Little Giant hub borer, J. G. Bricker, Waterloo. Machine Knives, Peter Hay, Galt
Best knitting machine (hand), Creelman Bros., Georgetown $4 00
Best writing machine, A. J. Henderson, Toronto (Caliograph) 6 00

EXTRAS.

Diploma :—Improved model Rag Carpet Loom, by non-mechanic, James Hopkins, Hamilton.

Highly Commended :—Hand Printing Press in operation, Wm. J. Dickson, Yorkville.

MECHANICAL METAL WORK.—(MISCELLANEOUS.)

CLASS LXII.

HARDWARE, CULTERY, BELLS, SAFES, SCALES, ETC.—75 ENTRIES.

JUDGES.—J. M. Green, St. Thomas; Benj. Mills, Paisley.

Best bells, church and school, assortment of Guelph Carriage Goods Company, Guelph $6 00
Best malleable hardware, assortment, Frost & Jones, Smith's Falls, per J. W. Bond & Co., Agents. 8 00
Best nails, 20 lbs., cut, Montreal Rolling Mills Co., per J. W. Bond & Co., Agents 4 00
Best nails, 20 lbs. pressed, Montreal Rolling Mills Co., per J. W. Bond, Guelph, Agents 4 00
Best horse shoe nails, 20 lbs., Montreal Rolling Mills Co., per J. W. Bond, & Co., Agents 4 00
Best nuts, hot pressed, assortment, Brown & Co., Paris, per J. W. Bond & Co., Agents 4 00
Best refrigerator, Withrow & Hillock, Toronto 6 00
2nd do Bryce Brothers, Toronto 4 00
Best scales, counter, Burrow, Stewart & Milne, Hamilton 4 00
2nd do Gurney & Ware, Hamilton 2 00

Best scales, platform, Burrow, Stewart & Milne, Hamilton $4 00
2nd do Gurney & Ware, Hamilton 2 00
Best screws and bolts, assortment, Canada Screw Co., Dundas, per J. W. Bond & Co., Agents 4 00
Best skates, assortment, Wm. Russell, Guelph 4 00
Best table cultery, John Askheim, Sheffield, England, per J. W. Bond & Co., Agents, Guelph 4 00
Best railroad supplies, an assortment, Ontario Car Manufacturing Co., London 6 00
Best water filter, J. C. Jewett & Son, Buffalo, N. Y., per J. W. Bond & Co., Agents, Guelph 4 00
Best sad irons, an assortment, Wm. Russell, Guelph 3 00

EXTRAS.

Bronze Medal :—An assortment of Knitting Needles for Power Machine, R. A. Dickson, Paris.
Diploma :—Saw Sets, Wm. Russell, Guelph; Semiphore Signal for Railway, Francis Culham, Princeton.
Highly Commended :—Model, Steam Yacht, James Barrett, Guelph.

GOLD, TIN AND COPPERSMITHS' WORKS, LOCKS, ETC.

Best fire arms, assortment, Alford & Berkill, New York, per J. W. Bond & Co., Agents $6 00
Best Goldsmith's work, George J. Fitzsimmons, Guelph 4 00
Best Silversmith's work, George J. Fitzsimmons, Guelph 4 00

EXTRAS.

Silver Medal :—Patent Sash Locks, J. H. Stone, Manufacturing Co., Hamilton.
Bronze Medal :—Assortment of Patent Lamps and Lanterns, J. H. Stone, Manufacturing Co.,
Diploma :—For Gold and Silversmith's work, George J. Fitzsimmons, Guelph.
Highly Commendad :—Electric Metal Wire, J. F. Lynch, New York; Climax Window Sash Lock, Miller Bro's & Co., Guelph.

INSTRUMENTS.—EXTRAS.

Silver Medal :—Artificial Limbs and Surgical Appliances, Authors & Son, Toronto.
Diploma :—Assortment of Silver Plating, Miller Bro's, Guelph.
Highly Commended :—Eureka Steam and Water Joint Cement, Samuel Antly, Chicago, per F. Smith, Agent, Toronto.

CLASS LXIII.

STOVES AND CASTINGS.—67 ENTRIES.

JUDGES.—R. J. Dunlop, Kingston; John Lowrie, Sarnia.

Bset car wheels, set of, Ontario Car Mf'g Co., Guelph $4 00
Best casting for general machinery, Robert Orr, Guelph 10 00
2nd do do Ontario Car Mf'g Co., London 6 00
Best casting for railway cars and locomotives, Ontario Car Mf'g Co., London 10 00
Best cast-iron work, ornamental fences, etc., Olmstead & Son Hamilton, per J. M. Bond & Co., Agt. 6 00
2nd do do Freeman & Sons, Racine, U. S., per J. W. Bond & Co., Agents, Guelph 4 00
Best cooking range, portable, The Ed. C. Gurney Co., Hamilton, per Wm. Sunley, Agent, Guelph. 6 00
2nd do Burrow, Stewart & Milne, Hamilton 4 00
Best cooking stove for wood, The Ed. C. Gurney & Co., Hamilton, per Wm. Sunley, Agent, Guelph 6 00
2nd do Burrow, Stewart & Milne, Hamilton 4 00
Best cooking stove, for coal, Burrow, Stewart & Milne, Hamilton 6 00
2nd do The Ed. C. Gurney Mf'g Co., Hamilton, per Wm. Sunley, Agent, Guelph 4 00
Best enamelled hollow ware. assortment, Lalame & Grosgean, Mf'g Co., New York, per J. M. Bond & Co., Agents, Guelph 4 00
Best furniture for cooking stove, one set, T. Phillips & Co., Orillia 4 00
2nd do do Wm. Sunley, Guelph 2 00
Best hall stoves, for wood, The Ed. C. Gurney Co., Hamilton, per Wm. Sunley, Agent, Guelph 4 00
2nd do Burrow, Stewart & Milne, Hamilton 2 00
Best hall stove, illuminated base burner, Burrow, Stewart & Milne, Hamilton 4 00
2nd do do The Ed. C. Gurney Co., Hamilton, per Wm. Sunley, Agent Guelph 2 00
Best parlor stove, for wood, The Ed. C. Gurney Co., Hamilton, per Wm. Sunley, Agent, Guelph .. 4 00
Best parlor stove, for coal, Burrow, Stewart & Milne, Hamilton 4 00
Best cooking stove, The Ed. C. Gurney Co., per Wm. Sunley, Agent, Guelph 4 00
2nd do Burrow, Stewart & Milne, Hamilton 2 00
Best parlor grate, Burrow, Stewart & Milne, Hamilton 4 00
Stoves, ranges and hollow-ware, best and largest display, The Ed. C. Gurney Co., Hamilton, per Wm. Sunley, Agent, Guelph ..... Silver Medal
Best coal oil stove, Iredale & Hickenson, Toronto 4 00

EXTRAS.

Silver Medal :—Exhibits from Steel Works, Castings, etc., London Steel Works, London.
Diploma :—Cooking Crock, John W. Fisher, Montreal.
Highly Commended :—Combined Sink and Basin, Iredale & Hickerson, Toronto.

SADDLE, HARNESS, AND TRUNKMAKERS' WORK, AND ENGINE HOSE AND BELTING.

CLASS LXIV.

SADDLERY, ETC.—43 ENTRIES.

JUDGES.—J. W. Campbell, Pinkerton, Stratford; Thomas Storey, Stratford.

Best collars, assortment of heavy, Walter W. Kinsey, Bracebridge	$4 00
Best harness, set of double carriage, E. W. Gollop, Norval	6 00
Best harness, set of single carriage, Wm. Fink, Millbank	6 00
2nd do E. W. Gollop, Norval	4 00
Best harness, set of team, P. Worden, Hillsbury	6 00
2nd do J. T. Scott, Morriston	4 00
Best heavy lumbermen's harness, Walter W. Kinsey, Bracebridge	6 00
Best India-rubber belting, engine hose, etc., an assortment, The Canadian Rubber Co., Montreal and Toronto, per J. M. Bond & Co., Agents, Guelph	6 00
Best leather machine belting, an assortment, The Chippewa Tannery, Leather and Belting Co., Chippewa	6 00
Best saddle, ladies', Cincinnati Saddlery Co., per Jos. A. Revell, Agent, Guelph	6 00
Best saddle, gentleman's, full quilted, Cincinnati Saddlery Co., per Jos. A. Revell, Agent, Guelph	5 00
Best saddle, gentleman's plain shaftoe, E. W. Gollop, Norval	5 00
Best trunks, assortment, H. E. Clark & Co., per Jos. A. Revell, Agent, Guelph	6 00
Best valises and travelling bags, an assortment, H. E. Clark & Co., per Jos. A. Revell, Agent, Guelph	4 00
Best whips, an arsortment, Hampden Whip Co., Westfield, Mass., U. S., per J. M. Bond & Co., Agents, Gulph	4 00
Best whip thongs, an assortment, Hampden Whip Co., Westfield, Mass., U. S., per J. M. Bond & Co., Bond & Co., Agents, Guelph	2 00

SADDLE AND HARNESS STOCK.

Best check, for horse collar, one piece, H. & J. B. Winger, Elmira	4 00
Best deerskins, three dressod, Henry Ferdinand, Waterloo	2 00
Best horse blankets, two pairs, Penman Mfg. Co., Paris	4 00
2nd do H. & J. B. Winger, Elmira	2 00
Best kersey, for horse clothing, one piece, H. & J. B. Winger, Elmira	4 00
Best lace leather, thirty pounds, Wm. G. Burnett, Galt	4 00
2nd do J. England & Son, Knowlton, per J. M. Bond & Co., Agents, Guelph	2 00

EXTRAS.

Silver Medal.—Display Belting, etc., The Chippewa Tannery, Leather Belting Co., Chippewa.

WEARING APPAREL AND FURS, FLAX, HEMP AND COTTON GOODS.

CLASS LXVI.

WEARING APPAREL.—34 ENTRIES.

JUDGES.—John H. Beck, Brampton; W. K. Atkinson, London.

Best gloves and mittens of leather, Brown & Erb, Berlin	4 00
2nd do Henry Ferdinand, Waterloo	2 00
Best gloves and mitts of kid, Brown & Erb, Berlin	4 00
Best gloves and mitts, woollen, Francis Smith, Guelph	4 00
2nd do Joseph Cartlidge, Guelph	2 00
Best and largest assortment of gloves, Brown and Earb	Bronze Medal
Best overcoat of Canadian cloth, Petley & Petley, Toronto	4 00
2nd do Guy & Husband, Guelph	2 00
Best shirt, gentlemen's, assortment, Stewart & Co., Guelph	3 00
Best made gentlemen's suit, Canadian cloth, Petley & Petley, Toronto	5 00
2nd do Guy & Husband, Guelph	3 00
Best suit, boys, Petley & Petley, Toronto	5 00
2nd do Guy & Husband	3 00
Best sleigh robes, assortment, not less than three kinds, Henry Ferdinand, Waterloo	6 00
Best twines, assortment, not less than three pounds each, W. B. Peruel & Co., Dover, per J. W. Bond & Co., Agents, Guelph	4 00

EXTRAS.

Silver Medals.—Corset, with improvement, Clinton E. Brush & Bros., Toronto. Ostrich Feathers, Madame Dubois and Fils, Toronto.

Bronze Medal.—Fur Gloves and Mitts, Spanish Deer Skins, Henry Ferdinand, Waterloo.

Highly Commended.—One dozen Ladies' Mitts, Joseph Cartlidge, Guelph. Fine Worsted Frock Suit, Petley & Petley, Toronto. Millinery, Mrs. Pass, Guelph.

CLASS LXVII.

WOOLLEN GOODS.—162 ENTRIES.

JUDGES.—F. H. Parker, Woodstock; Francis Anderson, Aultsville.

Best blankets, white, 2 pairs,	Wm. Slingsby & Sons, Brantford	$6 00
2nd do	H. & J. B. Winger, Elmira	4 00
Best blankets, grey, 2 pairs,	H. & J. B. Winger, Elmira	6 00
2nd do	Wm. Slingsby & Sons, Brantford	4 00
Best cloth, fulled, 3 pieces,	H. & J. B. Winger, Elmira	6 00
Best counterpanes, woven,	Malcolm Clark, Morriston	3 00
2nd do	John Rutherford, Roseville	2 00
Best etoffes, assortment, 3 pieces,	H. & J. B. Winger, Elmira	6 00
Best flannel, all wool white and colored, 3 pieces, 40 yds.,	H. & J. B. Winger, Elmira	5 00
2nd do	Malcolm Clark, Morriston	3 00
Best flannel, union, white and colored, 3 pieces,	H. & J. B. Winger, Elmira	6 00
2nd do	Christina McIntyre, Morriston	3 00
Best assortment flannels of Canadian manufacture,	H. & J. B. Winger, Elmira	Silver Medal
Best serge, white and colored, 3 pieces,	Malcolm Clark, Morriston	5 00
2nd do	Christina McIntyre, do	3 00
Best wincey, assortment of, 3 pieces,	Malcolm Clark, do	6 00
2nd do	Christina McIntyre, do	3 00
Worsted cloths, assortment of, 3 pieces,	McCrae & Co., Guelph	6 00
Best yarn, collection of, made from Canadian super. wool, assortment of mixtures, 3 lbs. each,	McCrae & Co., Guelph	Silver Medal
Best yarn, collection of, made from Merino or foreign wool, white, dyed and mixtures, 3 lbs. each,	McCrae & Co., Guelph	Silver Medal
Best yarn, collection of, combed, white, dyed, and mixtures, 3 lbs each,	McCrae & Co., Guelph	Silver Medal

EXTRAS.

Diplomas:—One dozen Windsor Fabric Horse Blankets, The Penman Manufacturing Co., (Limited) Paris. Assortment of Combed Yarns, McCrae & Co., Guelph.

Highly Commended:—Two pairs Union Sheeting Blankets, Slingsby & Sons, Brantford. Fancy Tweed Yarns, and Silver Tops, McCrae & Co., Guelph.

KNITTED GOODS.

Best Cardigan jackets, 1 doz.,	Jos, Cartlidge, Guelph	$3 00
2nd do	Francis Smith, do	2 00
Best drawers and shirts, plain, half-dozen of each,	McCrae & Co., Guelph	4 00
Best drawers and shirts, ribbed, half-dozen of each,	do do	4 00
Best half hose, assortment, 1 dozen,	do do	3 00
2nd do	Francis Smith, do	2 00
Best hose, ladies' and misses', plain and ribbed, assortment, half-dozen of each,	McCrae & Co., Guelph.	3 00

CARPETS ETC.

Best three pieces,	Henderson & Co., Durham, England, per Petley & Petley, Agents, Toronto	6 00
2nd do	Hughes & Sons, Kidderminster, do do	4 00
Best carpet, stair, 3 pieces,	J. & A. Armstrong & Co., Guelph	6 00
2nd do	Jos. Hopkins, Hamilton	4 00
Best rag carpets,	do do	3 00
2nd do	Mrs. Alex, Forbes, Fergus	2 00
Best rag Mats,	Ada Parkinson, Eramosa	2 00
2nd do	Misses J. & H Dalton, Eramosa	2 00
Best cocoa matting	Edward Shepherd & Son, Westmorland, per J. W. Bond & Co., Agents, Guelph	6 00

DOMESTIC WOOLLENS FROM HOME SPUN YARN.

Best cloth, fulled, farmers' make, piece not less than 20 yards,	C. T. Lane, Warkworth	4 00
2nd do	Malcolm Clark, Morriston	2 00
Best flannel, not factory made,	Christina McIntyre, do	4 00
2nd do	Malcolm Clark, do	2 00

Best yarn, white and dyed, not factory made,	Mrs. John Grieve,	Oustic	$2 00
2nd do	Christina McIntyre	Morriston	1 00
Best yarn, fleecy, woollen, not factory made.	Christina McIntyre,	Morriston	2 00
2nd do	Malcolm Clark,	do	1 00
Best woollen shawls, home made,	James Liddle,	Dundas	3 00
2nd do	Malcolm Clarke,	Morriston	2 00
Best blankets, home made,	Malcolm Clark,	do	3 00
2nd do	Duncon Gillies,	Moffatt	2 00

EXTRAS.

Bronze Medal :—Collection boys' Knitted Jersey suits, Ladies' Knitted Jersey's, Fancy Knitted Shirts, Ladies' Knitted Suits, and Ladies' Jersey Lily Jackets, Francis Smith, Guelph.

Diploma :—Union Carpets, J. & A. Armstrong & Co., Guelph.

Highly Commended :—Sample of wool, Merino grade, J. & R. Millar, Guelph. Boys' and Ladies' Knitted Ware, McCrae & Co., Guelph. Union Blankets, Wm. Slingsby & Sons, Brantford.

CLASS LXVIII.

GROCERIES AND PROVSIONS.—30 ENTRIES.

JUDGES.—Ed. Roblin, Ameliasburg ; Robert King, Barrie ; A. A. Carson, Russell.

Best barley flour,	Ed. Kendrew,	Pond Mills	$3 00
Best biscuits, collection of,	Christie, Brown & Co.,	Toronto	Silver Medal and 6 00
Best bottled fruit, assortment, manufactured for sale,	Mrs. R. Ainlay,	Guelph	4 00
Best buckwheat flour, 25 lbs.,	Ed. Kendrew,	Pond Mills	3 00
Best candles, tallow, 10 lbs.,	John McGill,	Eramosa	3 00
Canned fruit, largest and best varieties, made in factories for sale,	Mrs. Saml. Barber,	Guelph	Silver Medal
Best cigars, Canadian manufacture, assortment,	W. P. Benning,	Paris	4 00
Cigars, best made and flavored, single box,	do	do	4 00
Best Indian corn meal, 25 lbs.,	Ed. Kendrew,	Pond Mills	3 00
2nd do	J. D. Lutz,	Stoney Creek	2 00
Best sauces for table use, an assortment manufactured for sale,	Mrs. Saml. Barber,	Guelph	4 00
Best starch, 12 lbs. corn,	British American Starch Co.,	Brantford	2 00
Best starch, 12 lbs. flour,	do	do	2 00
Best starch, 12 lbs.,	do	do	2 00
Largest and best display of starch products,	British American Starch Co.,	Brantford	Silver Medal

CLASS LXIX.

21 ENTRIES.

JUDGES.—Prof. Mills, Ontario School of Agriculture ; W. Johnston, Barrister, Toronto.

The Council of Agriculture and Arts offered special prizes this year for essays on the following subjects :

The best and most practicable means of improving the quality of butter in Ontario, both as regards its manufacture in private dairies and in creameries, special attention being paid to the wants and capabilities of the Province in adapting this important article to the present requirements both of the domestic and foreign markets.

1st prize, special, by Provincial Government,	David Nicol,	Cataraqui	100 00
2nd prize, by Agriculture and Arts Association,	J. Smith, Jr.,	Ratho	50 00

The increasing tendency of the times for Farmers' Sons to leave the occupation of their fathers for other pursuits. Its cause and remedies.

1st prize,	Thomas Shaw, Editor *Stock Raisers' Journal*		30 00
2nd prize,	H. F. Honsberger,	Springfield	20 00

HENRY WADE,

Secretary.

COUNCIL MEETING.

Agricultural Hall, December 13th, 1883, 2 o'clock p.m.

Members present:—Messrs. D. P. McKinnon, President; Morgan, Legge, Aylesworth, Carnegie, Snell, Parker, Hunter, Shipley, White and Drury.

The minutes of the September meeting held in Guelph during the Thirty-Eighth Provincial Exhibition, were read by the Secretary and confirmed.

On a motion from Mr. Carnegie seconded by Mr. Shipley, Prof. Brown, of the Agricultural College, was heard.

He addressed the Council on the subject of the Live Stock of the Farm. They were deficient in some breeds, noticeably Holsteins and Jerseys, and would like the Council to pass a resolution recommending the Ontario Government to grant further aid to this department.

On motion of Mr. Drury seconded by Mr. Legge, a committee consisting of Messrs. Carnegie, Snell, White, and the mover, was appointed to report on this subject.

Prof. Brown, again asked the Council if a delegation of college students might visit the coming Fat Stock Show, and make a report on the cattle exhibited.

Moved by Mr. Carnegie seconded by Mr. Aylesworth, that the students be allowed to come and report on the Fat Stock, and that the following prizes be awarded them:

1st Prize, the 5th, 6th and 7th vols. of the "Canada Shorthorn Herd Book."
2nd do 2 vols. of the "Farmer's Guide," by Stephens & Norton.
3rd do 1st vol. of "North American Galloway Herd Book."

On motion of C. Drury seconded by J. Carnegie, Mr. John I. Hobson, of Mosborough, was appointed one of the auditors.

A communication was also received from the Hon. A. M. Ross, Commissioner of Agricultural, appointing Mr. J. B. Smyth, of London, the other auditor.

A communication was then read from the Clerk of the county of Simcoe, fowarding a report of their Finance Committee, expressing approval of the education scheme, and offering additional prizes to the amount of $100.00 to be given to five candidates, who out of the competitors from Simcoe, at the June examinations of the Association should gain the highest number of marks.

Several other letters were read endorsing the education scheme of the Association, and were all referred to the educational committee.

A letter was read from Mr. St. George Scarlett, asking to have his name reinstated on the books as a life member of the Association, it having, by some means, been omitted, also claiming fees as Superintendent. Referred to finance committee.

A letter was also read from Geo. Sleeman, Esq., Chairman of the Exhibition Committee, of the city of Guelph, as follows:—

Guelph, November 26th, 1883.

H. Wade, Esq., Secretary:

Dear Sir,—On behalf of the city of Guelph, I beg to ask that the Council of the Agriculture and Arts Association do consider the question of making such a grant, as they in their judgment think right to the city, to assist in reducing the heavy outlay incurred in holding the late exhibition. It is also necessary for me to state that the wishes of the Council were complied with in regard to accommodation, although it was very much in excess of what was asked for at first. Hoping you will lay this matter before the Council at its first meeting,

I remain, yours truly,

George Sleeman,
Chairman of Exhibition Committee.

This letter was referred to Finance Committee.

The Secretary then read the following report of his visit to Kansas city and Chicago Fat Stock Shows, and Galloway Breeders' Meetings.

The Council of the Agriculture and Arts Association of Ontario :

Gentlemen,—Some time ago I received letters from Mr. David McCrae, of Guelph, saying that he had received word from Kansas city that they were about starting another Galloway Herd Book there, and he thought that, in the interest of our Herd Book. I had better visit Kansas City and attend their meeting as well as the Fat Stock Show which was being held there at the same time. I consulted some members of our Council, and they also thought that I had better go. By the courtesy of the different railroads I made the journey without expense, and arrived at Kansas city on Friday morning the 2nd of November, having been two days and two nights on the way.

I found the exhibition was largely attended by western farmers, who deal in cattle very extensively. It opens the eyes of a Canadian to see them buy. There were sales of polled Aberdeen, Galloway, and Shorthorn cattle going on every day, and all were held in the fat stock enclosure at the rear of the buildings, and purchases had to enter the grounds to attend the sale.

On Friday afternoon Mr. A. B. Matthews disposed of sixteen young Galloway bulls about two years old each, and imported from Scotland, at an average price of $443.Q0 and thirteen heifers, at an average of $472.00 each. Mr. Cochrane had a sale the next day, and nearly all the cattle were purchased to go out on the ranches in the west. The Galloway bulls are in great demand, to cross with the native range cattle, and I must confess that as a Shorthorn man, I was astonished at the results of the first cross, with the black cattle. A number of them were on exhibition. They were undoubtedly fine animals for feeding. There was on exhibition a cross from a Texan cow, a native plain cow, a Shorthorn cow, a Hereford cow, and several others, and in all cases the horns were off, while in most cases the colour was black. On the Herefords, the white face was retained, as that has been a characteristic of the breed for so long a time that it is not easily removed, The crosses on Shorthorns are nearly always black as the colours of Shorthorns are different, and are more easily changed.

So the result of crossing with the black bulls on any breed, is a lot with even colour, no horns and a good hardy frame, ready to take care of themselves, and good feeders, and very hardy, especially the Galloway cross. A gentlemen from River Bend, Colorado, Mr. Metcalfe, gave his experience of the hardy nature of calves the result of a cross on Shorthorns. During a snow blizzard out there in breeding time, his Shorthorn cows were exposed to the cold. A number of them perished after calving, while their black calves came through absolutely without injury.

At the Kansas Show, with the exception of a few highly bred Herefords, Mr. Geary's polled Angus steer "Black Prince," and a few Durhams, the cattle had not the fine finished look that our fat cattle have. Being nearly all brought from the plains, they are large and coarse, not having had the same care as ours. But to show how much cheaper the farmers there can raise cattle, and to give you an adequate idea of the Kansas city live stock market, I will quote you the receipts of stock of 1882 :—439,671 cattle, 963,-036 hogs, 80,724 sheep, and 11,716 horses and mules.

I attended a meeting of the Galloway breeders on Friday evening, and was called on to explain the merits of the "North American Galloway Herd Book." They were all well enough pleased with the book, but it was not published in the United States, and to the meeting, that meant Kansas city, so a resolution was carried by only three of a majority, that as it was a Canadian copyright, and in the name of the Agriculture and Arts Association, instead of the Galloway Breeders, they could not support it, but must start one of their own. The real reason, however, for their refusing their support, was that our book was patronized by the breeders who had met at Chicago the year before, and not by the Kansas city breeders, there being a great rivalry between the north and south, and the Kansas city people ignoring what was done at Chicago, however, they only carried their resolution by a very small majority. I was shown every kindness by the management, and met a great many Galloway breeders, sold a good

many books, and took several entries, so that I believe we are sure to have a good deal of patronage from the south and west, even if they do start a new book, which is quite doubtful. I left before the show was over, well pleased with my trip, notwithstanding the defeat at the meeting, and determined to go back again to the Chicago Show, to attend the meeting of Galloway breeders there.

Kansas city is growing very fast, and promises to vie with Chicago in a few years with the cattle trade. It is built on a bluff of the Missouri river. The dwellings are built up on the bluff, but the stock yards are down on the flats, where the streets are in a dreadful state of mud up to one's boot tops. The street cars are drawn by mules, and as the mud drives the cars off the track occasionally, the passengers have to get out and wait patiently until they are got on again. For mud it is ahead of Toronto. The railroad interest is tremendous. No less than ten trains left the Union Station for the east, west, north, and south, inside of half an hour, the evening I left for home, and this without the slightest confusion.

After being at home about a week, I started again for Chicago, and attended their sixth Fat Stock Show. I did not get there until the second week, and it rained nearly all the time, but once inside the immense palace, the weather did not signify. The show of cattle was very fine, fully better than last year, and Canada was, as usual, well represented, five cattle from the Canadian exhibit taking twelve prizes. But as the show is well reported in all the papers, I pass on to the meeting of the North American Galloway Breeders, in which I was most interested, and cannot do better than give you a report of it, taken from the *National Live Stock Journal.*

North American Galloway Cattle Breeders' Association.

The above named association held a meeting in this city, Nov. 21st, with Mr. J. N. Smith, of Bath, Mich., in the chair. He congratulated the association on the increased interest taken in Galloway cattle, and referred in complimentary terms to the Herd Book, Vol. I. of which had been published under the auspices of the Agriculture and Arts Association of Ontario. This, he said, was the result of the action taken at the meeting in Chicago a year ago, and he considered the Association was much indebted to the Editor, Mr. Henry Wade, and to Mr. David McCrae, who had prepared a history of the breed as a preface for the volume, and rendered much assistance in its compilation, for their efficient service.

The following report was submitted by the committee appointed at the previous meeting:—In accordance with the instructions received at the meeting, of which you have just heard the minutes read, the Executive Committee have, during the past year, received from the Secretary of the Ontario Agriculture and Arts Association, with which your body made an arrangement a year ago for the publication of the pedigrees of your Galloway cattle, proof sheets of "North American Galloway Herd Book." These proof sheets have been carefully read, and, as a whole, have been found to be very satisfactory. In the effort to make the revision of the proofs as thorough as possible under the circumstances, the chairman of your committee, soon after receiving the proofs, visited those breeders who were among the first in this country to favour the cause of the Galloways, and with them scrutinized those pedigrees about which a shade of doubt might arise. In this work the homes of breeders in Wisconsin and Michigan were visited, and each pedigree in which those breeders were at any time interested, has been carefully considered. It is a pleasure to be able to add that all the gentlemen visited have given their aid most cheerfully, and it is believed that nearly, if not all, of the pedigrees recorded in this first volume of the "North American Galloway Herd Book" are correct in all essentials. It may be well to suggest that, as a matter of great interest to the breeders of Galloways, and as additional safeguards against error in entering pedigrees, it is advisable for the body to which the compiling and publication of the Herd Book has been intrusted, to publish in its next volume as full a list as can be made of the cattle in each herd of pure Galloways, which shall, at the time, be owned by Galloway breeders of North America; also to require of each breeder who may hereafter offer a pedigree for entry, a certificate of transfer

to him from the breeder of the animal he seeks to register; or, if the animal shall have been bred by the person seeking to register it, then certificates of transfer of its sire or dam, or both, do not now appear in the "North American Galloway Herd Book" accredited to the breeder offering the pedigree for registry. Further, that a record of the deaths of cattle registered in the first volume, or which may be recorded in future volumes, should be published in and form a part of these volumes; and that all breeders of Galloways should be requested to inform the Secretary of any death, or deaths, of registered Galloways of which they may learn; also, that the Secretary should be requested each week to prepare and send to the live-stock and agricultural papers in America, which may be willing to publish the same, lists giving transfers, deaths, and the pedigrees received for registry; that a list of prizes won by the cattle entered in the "North American Galloway Herd Book," and by their registered ancestry, should be prepared each year, and be made a part of the Herd Book. Finally, that hereafter no animal should be registered under a name the same as, or very nearly, like that of any other animal registered in any existing Galloway Herd Book.

The report was adopted, and it was voted to publish the second volume of the Herd Book as soon as possible, the same to be copyrighted in this State. It was also voted that the Executive Committee confer with the American Galloway Breeders' Association, of Kanas city, for the purpose of effecting a consolidation. Officers were elected as follows:—

Chairmen, J. N. Smith, D. McCrae. Council, J. N. Smith, H. G. Gue, A. C. Ducat, W. B. Hall, Peter Davy, P. Lasher, F. McHardy, R. Culver, W. Dunbar, D. McCrae. Executive Committee, H. G. Gue, F. McHardy, E. W. Perry, D. McCrae, R. B. Caruss. The meeting then adjourned.

Before adjourning, the meeting expressed their willingness to take the unsold volumes of the Galloway Herd Book from us at a somewhat reduced price, and to send in all their registrations as soon as possible, and thought it would be advisable to publish the second volume in parts, the same as the Scottish Book in a cheap form.

(Signed),

Toronto, Dec. 15, 1883. Henry Wade, *Secretary.*

On motion of Mr. Drury, seconded by Mr. Snell, a vote of thanks was given to the Secretary for his report, Mr. Drury stating that it was a good thing for their Association to have the Secretary visit the different places, and meet the officers of other institutions, to exchange ideas, and see the working of different institutions.

It was then moved by Mr. Legge, and seconded by Mr. White, that the Association hold an Exhibition in 1884, as usual.

Mr. Aylesworth supported the motion.

Mr. Carnegie took the same view, but contended that the fair should be made more distinctly agricultural. He also thought that the law should be amended that when the Exhibition was held in any county the funds usually granted to local associations of that county should be applied in aid of the Provincial for that year.

Mr. Parker strongly opposed restricting the Provincial to a farmer's show. If they took away the Fine Arts and Ladies' Work, attractions which drew the citizens of the cities and and towns in the neighbourhood of which the Provincial was held, they would loose a large portion of their receipts.

The Secretary read figures showing a large increase at the last Exhibition in the number of entries in live stock.

The motion was carried unanimously.

The Secretary called the attention of the Council to the fact that subjects for essays for 1884 would have to be chosen at this meeting.

Mr. Drury then spoke on the subject of noxious weeds, injurious to agriculture; said the Act at present only referred to Canadian thistles, but that he could name six other varieties of weeds which threatened the ruin of the agricultural interests of the country, and suggested that the Council give prizes for essays on the eradication of those weeds.

Mr. Stephen White, Chairman of the Provincial Ploughing Match for District number four, then read a report of their match.

To the President and Council of the Agriculture and Arts Association of Ontario:

GENTLEMEN,—The Provincial Ploughing Match in District Number Four came off on the 25th November, near Essex Centre, in the county of Essex, which proved a grand success.

In addition to the $300 granted by the Provincial Association, the County Council of Essex granted $100, and the North and South Riding Societies $50 each. This enabled us to give about $400 in prizes, which brought out a large number of competitors; eleven in the first-class, eighteen in the second, seven in the boys, and five in the fourth, or Skimmer plough class; forty-one in all; and two thousand spectators. The land was a stiff clay, and was rather dry; which made it difficult to do nice work, yet upon the whole it was well done.

In the evening a dinner was given to the ploughmen and others, and a good time was spent, first, in providing for the inner man, and then in discussing ploughing, farming, etc., all approving strongly of holding these matches, which brought together our boys and young men in contact with older men, and some from the older countries, who in some cases had to succumb to our native boys.

The following is a list of the successful prize winners, and the amount paid to each:

		$ c.
	1ST CLASS.	
1st.	Robert Simpson	40 00
2nd.	A. McDiarmid, jr	30 00
3rd.	John McGarvin	20 00
4th.	John Still	15 00
5th.	George Collison	10 00
6th.	David Hodson	5 00
	2ND CLASS.	
1st.	John Tape	30 00
2nd.	Chas. Johns	25 00
3rd.	Andrew Shillington	20 00
4th.	W. H. Cline	15 00
5th.	Daniel Fields	10 00
6th.	George Gammon	5 00
	3RD CLASS (Boys).	
1st.	George Darnton	25 00
2nd.	James Hedrick	20 00
3rd.	William Phillips	15 00
4th.	William Croft	10 00
5th.	James Walters	8 00
6th.	W. H. Millen	5 00
(Extra).	Wm. Dring	5 00
	4TH CLASS.	
1st.	George Rymal	25 00
2nd.	Martin Terryberry	20 00
3rd.	John R. Robinson	15 00
4th.	Joseph Robinson	10 00
5th.	Wm. D. Beattie	8 00
	Total	$391 00

FINANCIAL STATEMENT.

	$ c.		$ c.
Grant from Provincial Association	300 00	Prizes paid to ploughmen	391 00
" County Council of Essex	100 00	Printing 250 large bills	8 00
" North Riding Agricultural Society	50 00	Joseph Hunter, R. R. fare and expenses	20 00
" South " " "	50 00	L. E. Shipley, " " "	10 00
Two dinner tickets sold	50	S. White, " " " two journeys, postage, telegraph, etc	11 25
		Geo. Addeman, 42 dinner tickets to ploughmen and Committee	10 50
		Thos. Rush, Secretary, expenses, etc	6 25
		A. E. Jones, mowing ground, etc	6 50
		George Leak, expenses	1 00
		R. Smith, Judge	2 00
		Balance, one-half to each Riding Society	34 00
Total	$500 50	Total	$500 50

All of which is respectfully submitted.

S. WHITE,
JOS. HUNTER,
L. E. SHIPLEY, } Committee.

December, 13th, 1883.

After reading the report, Mr. White moved its adoption, which was seconded by Mr. Shipley. Mr. Parker spoke on the resolution, and said it was a matter of consideration whether the grants made for these matches could not be made use of in a more profitable manner, as he thought that the farmers were now well educated in ploughing. He then explained why no match was held in Division No. 3 this year.

Mr. Snell also said he thought that money given in prizes for these matches would be better employed in augmenting the prizes at the exhibition for Canadian bred cattle. He thought the matches were not much appreciated outside of the locality in which they were held.

Mr. Hunter spoke in favour of the Council assisting ploughing matches, as also did Messrs. Drury, Carnegie, and Morgan.

The resolution was carried.

Council then adjourned until 8 p.m.

COUNCIL ROOM, *8 p.m., Dec. 13th, 1883.*

The President took the chair; same members present with the addition of Mr. Geo. Moore.

Mr. Drury presented finance report No. 1, recommending payment of some accounts, and also explained that there were three accounts amounting to $39.01 not included, that should have been paid by the Ontario Government, as they were a part of the repairs account on the building. He also explained that the committee appointed at Guelph to wait on the Hon. Mr. James Young to effect a settlement of the building account, met in Toronto on the 24th of October, but in consequence of the illness of the Hon. Mr. Young

they could not have an interview, so consequently no settlement was made; and that at an interview he had that morning with the Hon. A. M. Ross, it was decided to postpone the settlement until the March meeting of the Council.

The report was adopted.

Mr. Drury then moved, seconded by Mr. Moore, that the three accounts above mentioned, viz., one to Rice Lewis & Co. for $10.24, one to D. S. Keith & Co. of $17 97, and one to Petley & Petley for $10.80, in all, $39.01, be paid, pending a final settlement with the Government. Carried.

Mr. Drury then presented report No. 2 of Finance Committee.

The Finance Committee beg leave to report, recommending:—

1. That the following amounts be asked from the Legislature for the year 1884, viz.:—

Prize farms	$250 00
Council expenses	725 00
Veterinary College	125 00
Essays	100 00
Salaries	1,500 00
Exhibition	5,000 00
Ploughing matches	1,300 00
Postages and printing	600 00
Education	500 00
Fat Stock Show	750 00
Total	$10,850 00

2. Your Committee would recommend that the Secretary be instructed to prepare, and your President requested to sign, a memorial to the Ontario Legislature and to the Lieutenant-Governor in Council, praying that the Agriculture and Arts Act may be so amended as to provide that the annual grant to the Agricultural and Horticultural Societies of the city or town in which the Provincial Exhibition is held, and of the Societies in the county in which such city or town is located, or which adjoin such city or town, shall for that year be paid over to this Association for the purpose of aiding them in holding such exhibition.

Respectfully submitted,

CHARLES DRURY,
Chairman.

TORONTO, *December 13th, 1883.*

On motion of Mr. Carnegie, seconded by Mr. White, the estimates for 1884 were adopted.

The next matter considered was the awarding of the special prize of a $50 tent. The judges' letters in reference to the subject were read, but as they did not throw much light on the subject it was resolved, on motion of Mr. Moore, seconded by Mr. Parker, that owing to the uncertainty of the matter the tent be not given this year.

The protest of Mr. Winger against the award of a silver medal to Messrs. McCrae & Co., of Guelph, for the best collection of yarns was disallowed, as the name of Messrs. McCrae & Co. was written plainly in the judges' book.

Mr. Ira Morgan then presented the report of the ploughing match in District No. 1.

To the President and Members of the Agriculture and Arts Association, of Ontario:—

GENTLEMEN,—The representatives of Nos. 1, 2 and 3, of the Agricultural Electoral Divisions of the Province of Ontario, beg leave to report as follows:—

The Provincial Ploughing Match for ploughing district No. 1, composed of the three electorial divisions Nos. 1, 2 and 3, took place on the 17th October last, on the farm of

James Carswell, Esq., on the banks of the river Boncherre, near the village of Renfrew, in the south riding of Renfrew. There were three classes, viz :

For those over twenty-one years ; for others between eighteen and twenty-one ; and for boys under eighteen years. In each of these classes there were seven prizes to compete for. The highest being $30, and reduced down, the lowest $5 ; amounting in all to $269. There were twenty-four entries. The majority of these being from the county of Renfrew. One from the county of Russell, and one from the county of Carleton ; these two parties driving a distance of over ninety miles to plough.

Duncan McDougall from the county of Russell, carried off the first prize in the senior class, and James Callendar from the county of Carleton, the second in the same class.

Some ploughmen would have come from the counties of Lanark and Carleton, but for the great distance, although application was made to the managers of railways, for reduced fares, which information that the same would be allowed was not received till the evening before the match.

The quantity of land alloted to each ploughman was about one-third acre. On account of frost the night previous, the ploughs were not able to commence work before 10 a.m., finishing at 4 p.m.

The field was well adapted for the purpose, containing about sixty-three acres free and clear of stumps and stones, the soil being of a gravelly loam ; when turned over showed the work of the plough to a good advantage.

The ploughing and work throughout the day was pronounced by those competent to judge, excellent, especially in the senior and junior classes. The depth of ploughing, the rule being not less than six inches, and the width of ridges not less than eight or more than nine inches.

The judges were brought from a distance, and were Mr. P. McNaughton, of Finch, Stormont county ; Wm. Eadie, President of the Russell County Agricultural Society and an importer of Clydes ; and John McGlashan, of Templeton, Ottawa county, the winner of Alonzo Wright's gold medal for ploughing.

The following were the prize winners :

Class 1.—1st, Duncan McDougall, $30 ; 2nd, James Callendar, $25 ; 3rd, John Gibbons, $20 ; 4th, R. A. Jamieson, $15 ; 5th, D. A. McIntyre, $10 ; 6th, John Airth, $7 ; 7th, Thomas Tosh, $5.

Class 2.—1st, James Leitch, jr., $25 ; 2nd, W. J. Scott, $20 ; 3rd, Allan McNab, jr., $15 ; 4th, Michael Leskie, $12.

Boys' Class.—1st, Robert Leitch, jr., $20 ; 2nd, John Cole, $15 ; 3rd, John McLaren, $10.

After the judges had decided on their awards, the same being handed to the Chairman, who announced the names of the winners. The prizes were presented by Mr. Legge, Vice-President of the Association (the President, Mr. McKinnon, being unavoidably absent) ; concluding the presentation with a short speech.

The attendance throughout the day by spectators was numerous, especially the farmers, who appeared to take a great interest in the work while it was in progress.

The weather being fine, bright and clear, as fine a day as could possibly be wished for.

The judges, director, visitors, and many of the spectators partook of a splendid dinner, provided by Mr. Carswell, and served under the shelter of the woods adjacant to the field. In the evening a dinner under the auspices of the President and Directors of the South Renfrew Agricultural Society was given to the visiting members of your Association, judges and gentlemen from a distance, who had attended the ploughing match. The chair was occupied by the President of the Society, James Carswell, Esq. About seventy of the leading farmers, merchants and other leading men of the county and village, occupied seats at the table. In response to the toast of the agricultural interests of the Province, and the Agriculture and Arts Association, Mr. Legge in reply on behalf of the Association, gave an interesting sketch of the objects of the Association, and of the work it has done in the promotion of agricultural interests, of the value of its annual exhibitions, of the establishment in connection with it of the Fat

Cattle Show now being held in the city of Toronto. Concluding by stating that if the next Provincial Exhibition should be held at Ottawa, he called upon the farmers and others, of that part of the district, to do their best to assist to make it a success. The general opinion expressed by the different speakers was, that by the holding of the ploughing match in that section, would have the effect of doing a good deal of good, and would give a stimulus to the ploughmen, especially the young, in the future.

Annexed is an account and statement of the expenses connected therewith.

All of which is respectively submitted.

IRA MORGAN,
Chairman.

December 12th, 1883.

FINANCIAL STATEMENT.

Grant for Distribution from Agriculture and Arts Association	$300 00	Prizes paid to ploughmen	$229 00
		Cash paid three Judges	31 50
		Printing 200 posters	12 00
		Advertising	5 00
		Postage	0 96
		Members expenses	21 54
	$300 00		$300 00

Mr. Morgan then moved the adoption of the report, which was seconded by Mr. Parker in a very humorous speech, and carried.

Mr. Snell apologized for the report of a part of District No. 2 not being ready but it was sent in a few days afterwards, and is as follows:

To the Council of the Agriculture and Arts Association of Ontario.

Report of Secretary-Treasurer of committee appointed to hold a Ploughing Match, under the auspices of the Agriculture and Arts Association of Ontario, and the east riding of York and Markham Agricultural Societies, beg to report that the ploughing match was held on the 31st day of October on the farm of Hugh Clark, Esq., lot 29, in the fourth concession of the township of Scarboro'. The day was fine but very cold. The ground was rather too dry to make ploughing look very smooth; but, for all, thirty-two ploughs started at half-past ten o'clock to compete for the laurels. The field was a fine one for such an occasion, a little over thirty rods long, with a slight rise in the middle, and very even throughout for each ploughman. The quantity of land ploughed by each ploughman was about one rood, eighteen poles: time at the rate of sixteen hours to the acre, which gave each man about five hours and forty-eight minutes to complete his lot. The ploughing was well done, considering the dryness of the ground. There was a large crowd of people gathered to witness the performance, who took a deep interest in the work, and remained to the last, anxious to learn whom the judges in each class would declare the successful competitors.

The judges selected for the occasion were, for the first and second classes, Messrs. Joseph Featherston, Trafalgar; Seth Haycock, King; and Robert Craig, Scarboro'. For the third and fourth classes, Messrs. Hepworth Chappel, Simcoe; John L. Paterson, Scarboro'; and John Morrison, Scarboro'. For the fifth and sixth classes, Messrs. Wm. Kerr, Whitby; George Forrester, Markham; and Dugald McLean, West York, who gave good satisfaction.

The members of the committee were John C. Snell, Esq., and Charles Drury, for the Board of Agriculture; Messrs. Wm. Milliken, Adam Hood, of Markham, and John Little, Thomas Hood, Simpson Rennie, and John Crawford, of Scarboro', who, was appointed Secretary-Treasurer to the committee.

Annex find detailed financial statement.

John Crawford, Secretary-Treasurer, in account with ploughing Committee.

RECEIPTS.

1883.		$ cts.
Oct. 31.	To Cash, John C. Snell, Esq., for Board Agriculture	200 00
"	" Jas. Robinson, Esq., for County Grant	200 00
"	Masson Sulky Rake from Oshawa Man. Co	30 00
"	Plough, from Wilkinson Manuf. Co	25 00
"	Cash A. Hood, special prize, best six furrows	5 00
"	" Wm. Pickard, best going and harnessed team	5 00
"	" Wm. Fleming, 2nd prize	3 00
"	" Robt. Graham, best finish in field	5 00
"	" James Rae, best and straighest ploughing (Boys' class)	2 00
"	" D. McLean, for boy that gets 1st prize	5 00
"	" A. Oxford, straighest ploughing in field	5 00
"	" Mr. Malone, 2nd prize best crown	2 00
"	" A. McCoullough, 2nd prize	1 00
		$488 00

EXPENDITURE.

1883.			
Oct. 9.	By Postage, etc		$0 50
" 15.	Postage on bills and putting up, etc		5 04

FIRST-CLASS.

Oct. 31.	By Cash A. Hood, 1st prize	$40 00	
"	" Wm. Milliken, 2nd prize	30 00	
"	" John Morgan, 3rd	20 00	
"	" Alex. Stewart, 4th	10 00	
"	" Robert Canning 5th	5 00	
			105 00

SECOND-CLASS.

Oct. 31.	By Cash, C. Bradenburgh, rake, 1st prize	$30 00	
"	" Spencer Crauley, 2nd prize	20 00	
"	" W. Ormarod, 3rd	15 00	
"	" John McLean, 4th	10 00	
"	" Geo. Yule, 5th	5 00	
"	" John Wood, 6th	3 00	
			83 00

THIRD-CLASS.

Oct. 31.	By Cash, Wm. T. Hood, plough, 1st prize	$25 00	
"	" Robt. McLean, 2nd	16 00	
"	" Henry Harding, 3rd	12 00	
"	" Thos. McCauley, 4th	8 00	
			61 00

FOURTH-CLASS.

Oct. 31.	By Cash, John Shadlock, 1st prize	$20 00	
"	" Geo. Riseborough, 2nd	16 00	
"	" Wm. Sandieson, 3rd	12 00	
			48 00

FIFTH-CLASS.

Oct. 31.	By Cash, Ed. Smillie, 1st prize	$20 00	
"	" James Drury, 2nd	16 00	
"	" Alex. Weir, 3rd	12 00	
"	" Jas. Maxwell. 4th	8 00	
"	" M. Elliott, 5th	4 00	
"	" Jno. Kennedy, 6th	2 00	
			62 00

SIXTH-CLASS.

Oct. 31.	By Cash, David Little, 1st prize		20 00
			$382 54

SPECIAL-PRIZES.

Oct. 31.	By Cash, A. Hood, best crown	$5 00	
"	" Jno. Morgan, 2nd "	3 00	
"	" Wm. Milliken, best going team	5 00	
"	" David Little, 2nd	3 00	
"	" S. Crauley, best finish	5 00	
"	" D. Little, straighest ploughing (boys' class)	2 00	
"	" D. Little, boy gets 1st prize	5 00	
"	" A. Hood, straightest ploughing in field	5 00	
			33 00

JUDGES.

Oct. 31.	By Cash, Hepworth Chappel		$10 00	
"	"	Jas. Featherston	5 00	
"	"	Wm. Kerr	3 00	
"	"	Seth Haycock	3 00	
"	"	J. L. Paterson	2 00	
"	"	John Morrison	2 00	
"	"	Geo. Forrester	2 00	
"	"	Dugald McLean	2 00	
"	"	Robt. Craig	2 00	
				31 00
				$446 54
Dec. 18.	By balance			41 46
				$488 00

P.S.—Any expenses that Messrs. Snell and Drury have been at has to be paid from the balance. Also the printing and the Secretary-Treasurer's Expenses have not yet been paid.

I have the honour to be, dear Sir,

Yours truly,

JOHN CRAWFORD,

Scarborough, Dec. 18th, 1883. Malvern, P.O., Ont.

Mr. Carnegie then made a verbal report of the match held in his part of District No. 2. It was also sent in afterwards, and is as follows:—

REPORT OF THE COMMITTEE FOR THE PROVINCIAL PLOUGHING MATCH HELD IN DISTRICTS NOS. 4 AND 5, IN 1883.

The undersigned have the honour to report that in accordance with their instructions a Provincial Ploughing Match was held on the farm of Henry Reid, Esq., in the township of Douro, in the county of Peterborough, situated about six miles from the town of Peterborough, on Thursday, the 18th of October, 1883. Open to ploughmen residing within the counties of Victoria, Northumberland, Durham, Peterborough, Prince Edward, Hastings, Lennox and Addington, when the following prizes were awarded, viz:

Class 1.—All comers' match, any plough, (five entries).—1st prize, James McNeil, Darlington, $30; 2nd prize, R. B. Bennett, Seymour, $20; 3rd prize, Fred. Waldon, Smith, $10.

Class 2.—Open to ploughmen under twenty-one years of age; any plough, (three entries.)—1st prize, Wm. Renwick, Harvey, $25; 2nd prize, Fred. Miles, Smith, $20; 3rd prize, John McFarlane, Otonabee, $15.

Class 3.—Open to ploughmen under eighteen years of age; any plough, (five entries)—1st prize, John Lumsden, Dummer, $25; 2nd prize, Walter McKee, North Monaghan, $20; 3rd prize, Joseph Montgomery, Otonabee, $15; 4th prize, Ottis Kidd, Dummer, $10; 5th prize, Malcolm Reid, Douro, $5.

Class 4.—Open only to ploughmen with skimmer or No. 40 plough, (three entries)—1st prize, Daniel Hennesey, Smith, $15; 2nd prize, John Frise, Smith, $10; 3rd prize, T. S. Breakenridge, Asphodel, $5.

The County Council of the county of Peterborough contributed $100 towards the funds of the match, on the condition that it be held within the county, and appointed their warden, Mr. John Maloney, a member of the committee on their behalf.

The committee regret to be obliged to report that the success of this match was materially lessened by the fact that they found much difficulty in obtaining the use of an even moderately suitable field for the purpose, while the want of previous rain operated seriously against the ploughmen on the heavy clay loam of the field upon which the match was held. Had it not been for these untoward circumstances the number of competitors would undoubtedly have been much larger, and the results, as a consequence, more satisfactory.

One of the chief difficulties in the way of obtaining the use of a suitable field, you committee found to be the practice of ploughing the lands at these matches only fifteen feet wide, which is much objected to by farmers in this section as detrimental to the subsequent use of the reaper and mower. Under these circumstances your committee would recommend that at future matches ploughmen should be required to plough lands of thirty feet in width, and that in order to give each contestant a beginning and a finish clearly his own they be required to "gee" a certain portion of their land and to "haw" the balance.

The duty of Judges was carefully, and, your Committee believe satisfactorily, performed by Messrs. P. Bristol, of Bath, and A. V. Price, Newburgh.

The following is a statement of the receipts and expenditure connected with the match:

RECEIPTS.

To Amount of appropriation by Association	$200 00
" amount from county of Peterborough	100 00
Total	$300 00

EXPENDITURE.

By Prizes	$225 00
" Judges ($10 each)	20 00
" Mr. Aylsworth, two trips to Peterborough	20 00
" Dinners for Judges, Committee, and general trouble given Mr. Reid	10 00
" Printing, horse hire, looking up field, taking Judges to grounds, etc., per Mr. Carnegie	25 00
	$300 00

All of which is respectfully submitted.

JOHN CARNEGIE,
J. B. AYLESWORTH.

December, 1883.

The meeting adjourned at 10 o'clock until Tuesday morning at nine a.m.

HENRY WADE, *Secretary.*

Friday, Dec. 14, 9 *a.m.*

The Council met pursuant to adjournment. Same members present as were in attendance yesterday.

The subject of essays was taken up, and it was decided to offer prizes for essays on the following subjects:—

For the best essay, founded on practically experience on the profit of breeding, feeding and fattening beef cattle for the market: first prize, $30; second prize, $20. The manuscript not to exceed twenty-five pages.

For the best and most speedy method of destroying thistles: first prize, $15; second, prize, $10.

For the best and most speedy method of destroying wild mustard: first prize, $15; second, $10.

For the best and most speedy way of destroying wild oats: first prize, $15; second, $10.

For the best and most speedy way of destroying couch or quack grass: first prize, $15; second, $10.

It was then moved by Mr. Drury and seconded by Mr. Hunter: "That a memorial be prepared by the Secretary, sealed and signed by the President and presented to the Legislature, praying that the Canada Thistle Act be amended by providing better means for carrying out its provisions, and also enlarging the scope of the said Act, by making it refer to other noxious weeds."—*Carried.*

Moved by Mr. Parker and seconded by Mr. White: "That the Special Committee to whom was referred the request of Professor Brown with reference to the stock to be kept on the Provincial Farm, be instructed to memorialize the Government in favour of their

providing sufficient funds, to procure and keep at the farm, first-class animals of the following breeds, viz.: Durhams, Galloways, Polled Angus, Herefords, Ayrshire, Holsteins, and Jerseys; also that the stock sold from the Ontario Farm, should be sold under such conditions, as would induce their rentention in the Province, for the improvement of its stock; also that records should be kept and published of the milk and butter product of the several breeds kept on the farm."—*Carried.*

It was then on motion of Mr. Carnegie, seconded by Mr. Drury, Resolved: "That this Council respectfully request the Minister of Education to issue a circular to the Trustees of Rural School Sections suggesting to them the propriety of their substituting the study of 'Tanner's First Principles of Agriculture' for some one of the other studies now being pursued in the schools under their control."

At this stage the Council were waited upon by Mr. J. H. Mason, Manager of the Canada Permanent Loan and Savings' Co., and Mr. Jones, the solicitor of the company, who addressed them on the benefits of the Torrens system of land transfer. After a little discussion on this matter, it was moved by Mr. White, seconded by Mr. Drury, and Resolved: "That this Council having heard the explanation of the delegates of the Canada Land Law Amendment Association, as to the proposed amendment of the land law, is of opinion that some change should be made in the direction indicated by such explanations and instructs the President and Secretary to seal and forward to the Ontario Legislature the petition now submitted."

The meeting then adjourned until March, 1884.

HENRY WADE,
Secretary.

REPORT OF FIRST ANNUAL XMAS FAT STOCK SHOW,

HELD UNDER THE AUSPICES OF THE

AGRICULTURE & ARTS ASSOCIATION OF ONTARIO AND THE TORONTO ELECTORAL DISTRICT AGRICULTURAL SOCIETY,

IN THE

CITY OF TORONTO, DECEMBER 14TH AND 15TH, 1883.

COMMITTEE OF MANAGEMENT.

From the Agriculture and Arts Association of Ontario.

CHARLES DRURY, M.P.P. ..... CROWN HILL.
JOHN CARNEGIE, M.P.P. ..... PETERBOROUGH.
GEORGE MOORE, ESQ. ..... WATERLOO.
J. C. SNELL, ESQ. ..... EDMONTON.

From the Toronto Electoral Division Agricultural Society.

ANDREW SMITH, V.S. ..... TORONTO.
WILLIAM RENNIE, ESQ. ..... "
J. J. WITHROW, ESQ. ..... "
J. E. MITCHELL, ESQ. ..... "

A. SMITH, *Chairman* ..... TORONTO.
J. P. EDWARDS, *Treasurer* ..... "
HENRY WADE, *Secretary* ..... "

Judges on Cattle—George Hood, Guelph; Mr. Morgan, Oshawa; P. Howden, Peterborough; and Mr. H. Rawlings, Ravenshoe.

CLASS I.—THOROUGHBRED CATTLE.

SEC. 1.—*Steer or Spayed Heifer, 3 and under 4 years. 2 entries.*

No.	EXHIBITOR.	Age in days on Dec. 14th, 1883.	Weight in lbs. on Dec. 14th, 1883.	Average gain per day in lbs. since birth.	Name of Animal.	Breed.
1	J. & R. McQueen, Salem.....	1336	1925	1.44	Red Duke	Shorthorn.
2	H. & I. Groff, Elmira..... ...	1342	2200	1.04	Champion	do

First premium, $40, to steer Champion, exhibited by H. & I. Groff, Elmira.
Second premium, $20, to steer Red Duke, exhibited by J. & R. McQueen, Salem.

SEC. 2.—*Steer or Spayed Heifer, 2 and under 3 years. 1 entry.*

No.	EXHIBITOR.	Age in days on 14th Dec., 1883.	Weight in lbs. on Dec. 14th, 1883.	Average gain per day in lbs. since birth.	Name of Animal.	Breed.
1	Richard Gibson, Delaware.....	947	2110	2.22	White Duke	Shorthorn.

First premium, $40, to steer White Duke, exhibited by Richard Gibson, Delaware.

SEC. 3.—*Steer or Spayed Heifer, 1 and under 2 years. 1 entry.*

No.	EXHIBITOR.	Age in days on Dec. 14th, 1883.	Weight in lbs. on Dec. 14th, 1883.	Average gain per day in lbs. since birth.	Name of Animal.	Breed.
1	H. & I. Groff, Elmira.....	545	1220	2.74	Baron	Shorthorn.

First premium, $25, to steer Baron, exhibited by H. & I. Groff, Elmira.

SEC. 4.—*Cows, 3 years and over. 6 entries.*

No.	EXHIBITOR.	Age in days on Dec. 14th, 1883.	Weight in lbs. on Dec. 14th, 1883.	Average gain per day in lbs. since birth.	Name of Animal.	Breed
1	J. & R. McQueen, Salem	3680	1860	1.97	Barbara Allan	Shorthorn.
2	H. & I. Groff, Elmira	2739	1920	1.42	Maid of Honour 6th.	do
3	do do	1714	1690	1.00	Princess Louisa	do
4	do do	2354	.. ....	.....	Duchess of Waterloo	do
5	John Russell, Brougham	2645	2650	.99	Fuschia Duchess	do
6	James Hunter, Alma	1804	1330	.73	Rose of Hope 4th	do

First premium, $30, to cow Maid of Honour 6th, exhibited by H. & I. Groff, Elmira.
Second premium, $15, to cow Fuschia Duchess, exhibited by John Russell, Brougham.
Third premium, $10, to cow Princess Louisa, exhibited by H. & I. Groff, Elmira.

CLASS II.—GRADES OR CROSSES OF ANY BREED.

SEC. 1.—*Steer or Spayed Heifer, 3 and under 4 years. 6 entries.*

No.	EXHIBITOR.	Age in days on Dec. 14th, 1883.	Weight in lbs. on Dec. 14th, 1883.	Average gain per day in lbs. since birth.	Name of Animal.	Breed.
1	H. & I. Groff, Elmira	1379	2120	1.53	Young Sherman	Grade Shorthorn.
2	do do	1342	1980	1.47	Punch	do
3	R. Telfer, Burgoyne	1245	2350	1.80	Sandy	do
4	M. M. Downing, Thedford	1095	1950	1.78	Adam	do
5	do do	1095	2220	1.85	Simon	do
6	do do	1100	2150	1.95	Romeo	do

First premium, $40, to steer Young Sherman, exhibited by H. & I. Groff, Elmira.
Second premium, $20, to steer Simon, exhibited by M. M. Downing, Thedford.
Third premium, $10, to steer Romeo, exhibited by M. M. Downing, Thedford.

SEC. 2.—*Steer or Spayed Heifer, 2 and under 3 years. 8 entries.*

No.	EXHIBITOR.	Age in days on Dec. 14th, 1883.	Weight in lbs. on Dec. 14th, 1883.	Average gain per day in lbs. since birth.	Name of Animal.	Breed.
1	Wm. Oliver, Brantford	737	.. ....	....	Chieftain	Grade Shorthorn.
2	do do	864	.. ....	.....	Sincerity	do
3	H. & I. Groff, Elmira	977	1940	1.98	Pilot	do
4	do do	910	1930	2.11	James (Twin)	do
5	do do	910	1950	2.14	Hopewell (Twin)	do
6	do do	970	1930	1.98	Elmira	do
7	do do	970	1840	1.89	Waterloo	do
8	R. Telfer, Burgoyne	880	1700	1.93	Billy	do

First premium, $40, to steer James (Twin), exhibited by H. & I. Groff, Elmira.
Second premium, $20, to steer Elmira, exhibited by H. & I. Groff, Elmira.
Third premium, $10, to steer Hopewell (Twin), exhibited by H. & I. Groff, Elmira.

SEC. 3.—*Steer or Spayed Heifer, 1 and under 2 years. 5 entries.*

No.	EXHIBITOR.	Age in days on Dec. 14th, 1883.	Weight in lbs. on Dec. 14th, 1883.	Average gain per day in lbs. since birth.	Name of Animal.	Breed.
1	Wm. Oliver, Brantford	.....	.....	.....	Pearl	Grade Shorthorn.
2	do do	.....	.....	.....	Ruby	do
3	H. & I. Groff, Elmira	626	1420	2.26	Aberdeen	do
4	John Kelly, Shakespeare	639	1410	2.20	John Cook	do
5	M. M. Downing, Thedford	.....	.....	.....	Not Forward	

First premium, $25, to steer Aberdeen, exhibited by H. & I. Groff, Elmira.
Second premium, $15, to steer John Cook, exhibited by John Kelly, Shakespeare.

SEC. 4.—*Cow, 3 years and over. 5 entries.*

No.	EXHIBITOR.	Age in days on Dec. 14th, 1883.	Weight in lbs. on Dec. 14th, 1883.	Average gain per day in lbs. since birth.	Name of Animal.	Breed.
1	J. & R. McQueen, Salem	1335	2050	1.53	Daisy	Grade Shorthorn.
2	do do	1402	1630	1.16	Lily	do
3	H. & I. Groff, Elmira	1707	1930	1.13	Blossom	do
4	do do	1365	1850	1.35	Louisa	do
5	John Phin, Hespeler	2190	1970	.89	Little Grey	do

First premium, $30, to cow Daisy, exhibited by J. & R. McQueen, Salem.
Second premium, $15, to cow Blossom, exhibited by H. & I. Groff, Elmira.
Third premium, $10, to cow Lily, exhibited by J. & R. McQueen, Salem.

CLASS III.—SWEEPSTAKES FOR CATTLE.

SEC. 1.—*Best Steer or Spayed Heifer of any age or breed. 7 entries.*

No.	EXHIBITOR.	Age in days on Dec. 14th, 1883.	Weight in lbs. on Dec. 14th, 1883.	Average gain per day in lbs. since birth.	Name of Animal.	Breed.
1	J. & R. McQueen, Salem	1336	1925	1.44	Red Duke	Shorthorn.
2	Wm. Oliver, Brantford	737	.....	.....	Chieftain	Grade Shorthorn.
3	H. & I. Groff, Elmira	1342	2200	1.64	Champion	Shorthorn.
4	R. Telfer, Burgoyne	880	1700	1.93	Billy	Grade Shorthorn.
5	Richard Gibson, Delaware	947	2110	2.22	White Duke	Shorthorn.
6	John Norris, Ravenshoe	1714	2350	1.39	Riley	Grade Shorthorn.
7	M. M. Downing, Thedford	1095	1950	1.78	Adam	do

Premium, $30, awarded to Shorthorn steer Champion, exhibited by H. & I. Groff, Elmira.

SEC. 2.—*Best Female of any age or breed. 5 entries.*

No.	EXHIBITOR.	Age in days on Dec. 14th, 1883.	Weight in lbs. on Dec. 14th, 1883.	Average gain per day in lbs. since birth.	Name of Animal.	Breed.
1	J. & R. McQueen, Salem	1335	2050	1.53	Daisy	Grade Shorthorn.
2	Wm. Oliver, Brantford				Sincerity	do
3	H. & I. Groff, Elmira	2739	1920	1.42	Maid of Honour	Shorthorn.
4	John Russell, Brougham	2645	2650	.99	Fuschia's Duchess	do
5	M. M. Downing, Thedford	730			Dora	Grade Shorthorn.

Premium, $20, to Shorthorn cow Maid of Honour, exhibited by H. & I. Groff, Elmira.

Judges on Sheep and Pigs—James E. Parsons, Brampton; J. M. Carter, Toronto; Henry Wickson, Toronto.

CLASS IV.—SHEEP; LONG WOOLLED.

SEC. 1.—*Wether, 2 and under 3 years. 3 entries.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	John Rutherford, Roseville	Champion	
2	do do	Sandy	
3	do do	Jim Brown	

First Premium, $15, second, $10, and third, $5, to John Rutherford, Roseville.

SEC. 2.—*Wether, 1 and under 2 years. 5 entries.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	John Rutherford, Roseville	Cunningham	
2	do do	Bob	
3	Mrs. M. N. Hood, Guelph		
4	Jas. G. Wright do		
5	do do		

First premium, $15, and second, $10, to John Rutherford, Roseville.
Third premium, $5, to Jas. G. Wright, Guelph.

SEC. 3.—*Wether, under 1 year. 4 entries.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	John Rutherford, Roseville	Curly Tim	
2	John Kelly, Shakespeare	Bob	
3	Mrs. Marion N. Hood, Guelph		
4	do do		

First premium, $10, to John Rutherford, Roseville.
Second premium, $5, to John Kelly, Shakespeare.

SEC. 4.—*Ewe, 2 and under 3 years. 4 entries.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	John Rutherford, Roseville	Queen of the Plains.	
2	James Slimmon, Winfield		
3	do do		
4	Mrs. M. N. Hood, Guelph		

First premium, $15, to John Rutherford, Roseville.
Second premium, $10, to James Slimmon, Winfield.
Third premium, $5, to Mrs. M. N. Hood, Guelph.

SEC. 5.—*Ewe, 1 and under 2 years. 2 entries.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	John Kelly, Shakespeare	Peg	
2	do do	Jean	

First Premium, $15, and second, $10, to J. Kelly, Shakespeare.

SEC. 6.—*Ewe under 1 year. 2 entries.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	John Rutherford, Roseville	Jeamie	
2	John Kelly, Shakespeare	Sally	

First premium, $10, to John Kelly, Shakespeare.
Second premium, $5, to John Rutherford, Roseville.

CLASS V.—MIDDLE WOOLLED SHEEP.

SEC. 1.—*Wether, 2 and under 3 years. 3 entries.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	John Rutherford, Roseville	Dick	
2	Jas. G. Wright, Guelph		
3	do do		

First premium, $15, to John Rutherford, Roseville.
Second premium, $10, to James G. Wright, Guelph.
Third premium, $5, to James G. Wright, Guelph.

SEC. 2.—*Wether, 1 and under 2 years. 6 entries.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	John Rutherford, Roseville	Black Tom	
2	do do	Robin Hood	
3	Mrs. M. N. Hood, Guelph		
4	Jas. G. Wright do		
5	do do		
6	do do		

First premium, $15, to Jas. G. Wright, Guelph.
Second premium, $10, to Mrs. M. N. Hood, Guelph.
Third premium, $5, to Jas. G. Wright, Guelph.

SEC. 3.—*Wether under 1 year. 2 entries.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	Mrs. M. N. Hood, Guelph		
2	do do		

First premium, $10, and second, $5, to Mrs. M. N. Hood, Guelph.

SEC. 4.—*Ewe, 2 and under 3 years. 3 entries.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	John Dryden, M.P.P., Brooklin	Beauty	
2	do do	Daisy	
3	Mrs. Marion N. Hood, Guelph		

First premium, $15, to Mrs. M. N. Hood, Guelph.
Second, $10, and third, $5, to John Dryden, M.P.P., Brooklin.

SEC. 5.—*Ewe, 1 and under 2 years. 2 entries. None exhibited.*

SEC. 6.—*Ewe, under 1 year. 2 entries.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	Mrs. M. N. Hood, Guelph		
2	do do		

First premium, $10, and second, $5, to Mrs. M. N. Hood, Guelph.

CLASS VI.—SWEEPSTAKES FOR SHEEP.

SEC. 1.—*Best Wether of any age or breed. 3 entries.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	John Rutherford, Roseville	Champion	
2	Mrs. M. N. Hood, Guelph		
3	Jas. G. Wright, do		

Sweepstakes prize, $15, to John Rutherford, Roseville.

SEC. 2.—*Best Ewe of any age or breed. 5 entries.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	John Rutherford, Roseville	Queen of the Plains,	
2	John Dryden, M.P.P., Brooklin	Beauty	
3	John Kelly, Shakespeare	Peg	
4	Mrs. M. N. Hood, Guelph		
5	Jas. Slimmon, Winfield		

Sweepstakes prize, $10, to Mrs. M. N. Hood, Guelph.

CLASS VII.—HOGS, ANY BREED.

SEC. 1.—*Barrow, 1 and under 2 years.*

No.	EXHIBITOR.	Age of Animal.	Breed.
1	William Harris, Toronto	14 months	Suffolk
2	do do	do.	
3	do do	do.	
4	do do	do.	

First premium, $15, second, $10, and third, $5, to William Harris, Toronto.

SEC. 2.—*Barrow, under 1 year. 1 entry.*

No.	EXHIBITOR.	Age of Animal.	Breed.
1	Joshua Sisley, Richmond Hill	5 months 3 weeks	

First premium, $5, to Joshua Sisley, Richmond Hill.

SEC. 3.—*Sow, 1 and under 2 years. 3 entries.*

No.	EXHIBITOR.	Age of Animal.	Breed.
1	Robert Dorsey & Son, Summerville	1 year 11 months	Suffolk
2	Joshua Sisley, Richmond Hill	1 year 2 months	
3	Joseph Featherston, Credit	1 yr. 10 mo. 2 weeks	

First premium, $15, to Robert Dorsey & Son, Summerville.
Second premium, $10, to Joseph Featherston, Credit.
Third premium, $5, to Joshua Sisley, Richmond Hill.

SEC. 4.—*Sow, under 1 year. 2 entries.*

No.	EXHIBITOR.	Name of Animal. and age.	Breed.
1	George Savage, Burnhamthorpe	Susan	
2	Joseph Featherston, Credit	11 months	

First premium, $15, to George Savage, Burnhamthorpe.
Second premium, $10, to Joseph Featherston, Credit.

CLASS VIII.—SWEEPSTAKES FOR HOGS.

SEC. 1.—*Best Hog, any age, breed, or sex. 4 entries.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	George Savage, Burnhamthorpe		
2	Robert Dorsey & Son, Summerville		
3	Joshua Sisley, Richmond Hill		
4	Joseph Featherston, Credit		

First premium, $20, to Robert Dorsey & Son, Summerville.

CLASS IX.—CARCASS OF PORK.

SEC. 3.—*Best Carcass, any age, breed, or sex. 1 entry.*

No.	EXHIBITOR.	Name of Animal.	Breed.
1	George Savage, Burnhamthorpe		

First premium, $10, to George Savage, Burnhamthorpe.

Judges on Poultry—James Main, Boyne; J. James and John Holderness, Toronto.

CLASS X. FAT POULTRY (ALIVE).

SEC. 1.—*Best Turkey Cock (old).* 2 *entries.*

No.	EXHIBITOR.
1	Mrs. Thomas Card, Marden.
2	Joseph Tomalin, Brampton.

Premium, $1.50, Joseph Tomalin, Brampton.

SEC. 3.—*Best Turkey Hen (old).* 2 *entries.*

No.	EXHIBITOR.
1	Mrs. Thomas Card, Marden.
2	Joseph Tomalin, Brampton.

Premium, $1.50, Joseph Tomalin, Brampton.

SEC. 4.—*Best Turkey Hen (young)* 3 *entries.*

No.	EXHIBITOR.
1	Mrs. Thos Card, Marden.
2	John Rutherford, Roseville.
3	Joseph Tomalin, Brampton.

Premium, $1.50, Joseph Tomalin, Brampton.

SEC. 7.—*Best Goose (old).* 2 *entries.*

No.	EXHIBITOR.
1	R. Dorsey & Son, Summerville.
2	Joseph Tomalin, Brampton.

Premium, $1.50, R. Dorsey & Son, Summerville.

SEC. 9.—*Best Drake (old).* 2 *entries.*

No.	EXHIBITOR.
1	Joseph Tomalin, Brampton.
2	R. Dorsey & Son, Summerville.

Preimum, $1.50, R. Dorsey & Son, Summerville.

SEC. 10.—*Best Drake (young).* 3 *entries.*

No.	EXHIBITOR.
1	Joseph Tomalin, Brampton.
2	R. Dorsey & Son, Summerville.
3	do do

Premium, $1.50, R. Dorsey & Son, Summerville.

SEC. 11.—*Best Duck (old).* 2 *entries.*

No.	EXHIBITOR.
1	Joseph Tomalin, Brampton.
2	R. Dorsey & Son, Summerville.

Premium, $1.50, R. Dorsey & Son, Summerville.

SEC. 17.—*Best Display of Live Fat Poultry.* 1 *entry.*

No.	EXHIBITOR.
1	Joseph Tomalin, Brampton.

Premium, $5.00, Joseph Tomalin, Brampton.

CLASS XI.—DRESSED POULTRY.

SEC. 1.—*Best Turkey Cock (old).* 5 *entries.*

No.	EXHIBITOR.
1	Mrs. Thomas Card, Marden.
2	John Rutherford, Roseville.
3	Joseph Tomalin, Brampton.
4	C. E. Brown, Mimico.
5	George Savage, Burnhamthorpe.

Premium, $1.50, to Mrs. Thomas Card, Marden.

SEC. 2.—*Best Turkey Cock (young).* 5 *entries.*

No.	EXHIBITOR.
1	Mrs. Thomas Card, Marden.
2	John Rutherford, Roseville
3	Joseph Tomalin, Brampton.
4	C. E. Brown, Mimico.
5	George Savage, Burnhamthorpe.

Premium, $1.50, to Mrs. Thomas Card, Marden.

SEC. 3.—*Best Turkey Hen (old).* 5 *entries.*

No.	EXHIBITOR.
1	Mrs. Thomas Card. Marden.
2	John Rutherford, Roseville.
3	Joseph Tomalin, Brampton.
4	C. E. Brown, Mimico.
5	George Savage, Burnhamthorpe.

Premium, $1.50, to Joseph Tomalin, Brampton.

SEC. 4.—*Best Turkey Hen (young).* 5 *entries.*

No.	EXHIBITOR.
1	Mrs. Thomas Card, Marden.
2	John Rutherford, Roseville.
3	Joseph Tomalin, Brampton.
4	C. E. Brown, Mimico.
5	George Savage, Burnhamthorpe.

Premium, $1.50, to Joseph Tomalin, Brampton.

SEC. 5.—*Best Gander (old).* 4 *entries.*

No.	EXHIBITOR.
1	John Rutherford, Roseville.
2	Joseph Tomalin, Brampton.
3	C. E. Brown, Mimico.
4	George Savage, Burnhamthorpe.

Premium, $1.50, to Joseph Tomalin, Brampton.

SEC. 6.—*Best Gander (young).* 5 *entries.*

No.	EXHIBITOR.
1	Mrs. Thomas Card, Marden.
2	John Rutherford, Roseville.
3	Joseph Tomalin, Brampton.
4	C. E. Brown, Mimico.
5	George Savage, Burnhamthorpe.

Premium, $1.50, to Mrs. Thomas Card, Marden.

SEC. 8.—*Best Goose (young).* 5 *entries.*

No.	EXHIBITOR.
1	Mrs. Thomas Card, Marden.
2	John Rutherford, Roseville.
3	Joseph Tomalin, Brampton.
4	C. E. Brown, Mimico.
5	George Savage, Burnhamthorpe.

Premium, $1.50, to Mrs. Thomas Card, Marden.

SEC. 10.—*Best Drake (young).* 6 *entries.*

No.	EXHIBITOR.
1	Mrs. Thomas Card, Marden.
2	John Rutherford, Roseville.
3	Robert Dorsey & Son, Summerville.
4	Joseph Tomalin, Brampton.
5	C. E. Brown, Mimico.
6	George Savage, Burnhamthorpe.

Premium, $1.50, to Mrs. Thomas Card, Marden.

SEC. 12.—*Best Duck (young).* 5 *entries.*

No.	EXHIBITOR.
1	Mrs. Thomas Card, Marden.
2	John Rutherford, Roseville.
3	Joseph Tomalin, Brampton.
4	C. E. Brown, Mimico.
5	George Savage, Burnhamthorpe.

Premium, $1.50, to Mrs. Thomas Card, Marden.

SEC. 13.—*Best Cock (old).* 5 *entries.*

No.	EXHIBITOR.
1	John Rutherford, Roseville.
2	Joseph Tomalin, Brampton.
3	C. E. Brown, Mimico.
4	George Savage, Burnhamthorpe.
5	Mrs. Thomas Card, Marden.

Premium, $1.50, to Mrs. Thomas Card, Marden.

SEC. 14.—*Best Cock (young).* 5 *entries.*

No.	EXHIBITOR.
1	Mrs. Thomas Card, Marden.
2	John Rutherford, Roseville.
3	Joseph Tomalin, Brampton.
4	C. E. Brown, Mimico.
5	George Savage, Burnhamthorpe.

Premium, $1.50, to Mrs. Thomas Card, Marden.

SEC. 15.—*Best Hen (old)* 5 *entries.*

No.	EXHIBITOR.
1	Mrs. Thomas Card, Marden.
2	John Rutherford, Roseville.
3	Joseph Tomalin, Brampton.
4	C. E. Brown, Mimico.
5	George Savage, Burnhamthorpe.

Premium, $1.50, to Joseph Tomalin, Brampton.

SEC. 16.—*Best Pullet.* 5 *entries.*

No.	EXHIBITOR.
1	Mrs. Thomas Card, Marden.
2	John Rutherford, Roseville.
3	Joseph Tomalin, Brampton.
4	C. E. Brown, Mimico.
5	George Savage, Burnhamthorpe.

Premium, $1.50, Joseph Tomalin, Brampton.

SEC. 17.—*Best Display of Dressed Poultry.* 5 *entries.*

No.	EXHIBITOR.
1	Mrs. Thomas Card, Marden.
2	John Rutherford, Roseville.
3	Joseph Tomalin, Brampton.
4	C. E. Brown, Mimico.
5	George Savage, Burnhamthorpe.

Premium, $5, to Joseph Tomalin, Brampton.

CLASS XII.—SPECIAL PREMIUMS.

SEC. 1.—*Best Fat Shorthorn Steer or Cow of any age. Prize offered by the Shorthorn Breeders of Ontario. The exhibitor must win this Service twice before it becomes his permanent property. 4 Entries.*

Service of Silver Plate. Value $100.

No.	Exhibitor.	Age in days on Dec. 14th, 1883.	Weight in lbs. on Dec. 14th, 1883.	Average gain per day in lbs. since birth.	Name of Animal.	Breed.
1	J. & R. McQueen, Salem	1336	1925	1.44	Red Duke	Shorthorn.
2	H. & I. Groff, Elmira	1342	2200	1.64	Champion	do
3	John Russell, Brougham	2645	2650	.99	Fuschia Duchess	do
4	Richard Gibson, Delaware	947	2110	2.22	White Duke	do

Premium, Service Silver Plate, to steer "Champion," exhibited by H. & I. Groff, Elmira.

SEC. 2.—*Carload of ten Fat Cattle, any age, breed, or sex. First Prize, $60, offered by G. F. Frankland, Toronto. Second Prize, $40, by Directors. 5 entries.*

No.	Exhibitor.
1	William Oliver, Brantford.
2	H. & I. Groff, Elmira.
3	do do
4	J. & H. Fisher, Milton.
5	Britton Bros., Toronto.

First premium, $60, to H. & I. Groff, Elmira.
Second premium, $40, to Britton Bros., Toronto.

SEC. 3.—*Best Fat Beast on the ground, of any age, breed or sex. Prize, $50, offered by John Holderness, Toronto. 11 entries.*

No.	Exhibitor.	Age in days on Dec. 14th, 1883.	Weight in lbs. on Dec. 14th, 1883.	Average gain per day in lbs. since birth.	Name of Animal.	Breed.
1	J. & R. McQueen, Salem	1335	2050	1.53	Daisy	Grade Shorthorn.
2	Wm. Oliver, Brantford	737	.....	.....	Chieftain	do
3	do do	864	.....	.....	Sincerity	do
4	H. & I. Groff, Elmira	1342	2200	1.64	Champion	Shorthorn.
5	John Russell, Brougham	2645	2650	.99	Fuschia Duchess	do
6	R. Telfer, Burgoyne	880	1700	1.93	Billy	Grade Shorthorn.
7	Richard Gibson, Delaware	947	2110	2.22	White Duke	Shorthorn.
8	John Norris, Ravenshoe	1714	2360	1.39	Riley	Grade Shorthorn.
9	J. & R. McQueen, Salem	2190	.....	.....	Duke of Athol	do
10	M. M. Downing, Thedford	630	.....	.....	Dora	do
11	do do	1100	2150	1.95	Romeo	do

Premium, $50, to Shorthorn steer "Champion," exhibited by H. & I. Groff, Elmira.

SECT. 4.—*Heaviest Fat Steer or Cow of any age or breed. Prize, $25.00, offered by Andrew Smith, V.S., Toronto. 6 entries.*

No.	EXHIBITOR.	Age in days on Dec. 14th, 1883.	Weight on Dec. 14th, 1883.	Average gain per day in pounds since birth.	Name of Animal.	Breed.
1	H. & I. Groff, Elmira					
2	John Russell, Brougham	2645	2650	0.99	Fuschia Duchess	Shorthorn
3	R. Telfer, Burgoyne	1245	2350	1.80	Sandy	do
4	John Norris, Ravenshoe	1714	2350	1.39	Riley	do
5	M. M. Downing, Thedford	730			Dora	do
6	do do	1195	2220	1.85	Simon	do

Premium $25, equally divided between steers Sandy, exhibited by R. Telfer, Burgoyne, and Riley, exhibited by John Norris, Ravenshoe, both weighing exactly the same.

SEC. 5.—*Best Herd of Fat Cattle for Shipping. Prize, $100, offered by the Empire Horse and Cattle Food Co., Mitchell. 2 entries.*

No.	EXHIBITOR.
1	J. & R. McQueen, Salem
2	H. & I. Groff, Elmira

Premium, $100, to H. & I. Groff, Elmira.

SEC. 6.—*Three best Fat Cattle any age or breed. Prize, $50.00, offered by The Thorley Horse and Cattle Food Co., Hamilton. 1 entry.*

No.	EXHIBITOR.
1	H. and I. Groff, Elmira

Premium $50 to H. & I. Groff, Elmira.

HENRY WADE,
Secretary Fat Stock Show.

Financial Results of Fat Stock Show

Held under the Auspices of the Agriculture and Arts Association and the Toronto Electoral District Agricultural Society.

In Cattle there were	83	entries,	to which was paid in	premiums	$890 00
In Sheep	" 46	"	"	"	290 00
In Hogs	" 16	"	"	"	120 00
In Poultry	" 113	"	"	"	40 00

Receipts.

Toronto Electoral District Society grant	$500 00	
Agriculture and Arts Association grant	500 00	
Special Prizes	385 00	
Gate Receipts	176 90	
Entry Fees	174 25	
Balance paid by Electoral District	33 76	
Balance paid by Agriculture and Arts Association	33 77	
		$1,803 68

Expenditures.

Paid Judges and working expenses	$95 05	
Band	28 00	
Fitting up Building	87 75	
Electric Light	47 00	
Printing and Advertising	205 88	
Prizes	1,340 00	
		$1,803 68

Examined and found correct.

James Rennie, *Auditor.*

As will be seen by this statement of our treasurer, Mr. J. P. Edwards, the show has not been a financial success, a great deal of which is attributed to the poor buildings that had to be used, while, at the same time, the drill shed, which would have been very suitable, was lying idle and could not be obtained by the management. As far as fat cattle were concerned, the show was magnificent, and the management were well pleased that such a fine lot were got together for their first show.

The protest of W. R. Gibson was adjudicated upon by the Directors, and the prizes remain as awarded by the judges.

Very good descriptions of the stock will be found in the essays of the three students from the Guelph College, which appear below.

Henry Wade, *Secretary.*

To the Council of the Agriculture and Arts Association:

Having examined the papers on the Toronto Fat Stock Show prepared by students of the Ontario Agricultural College for prize competition, the undersigned have the honour to report:

1. That three students of the college have competed for the premiums offered by Association, viz.: Messrs. Wm. Little, W. W. Hubbard, and J. B. McKay, and that each of the papers possesses distinctive merits.

2. That Mr. Little's excels in form and method. The leading features of the exhibition are noted, the prize winning animals are fairly described, and the advantages of fat stock shows and requirements for their success are well stated.

3. That Mr. Hubbard's is readable and popular. It is, however, deficient in arrangement, and the description of animals is mainly confined to first prize winners.

4. That Mr. McKay's presents crisp, graphic and life-like word pictures of animals, but has conspicuous faults of form and style.

Measured by the standard of general merits, the undersigned are of opinion that Mr. Little's paper is entitled to the first prize. Mr. Hubbard's to the second, and Mr. McKay's to the third. For literary merit Mr. Hubbard's paper ranks first, and for descriptive merit Mr. McKay's is first.

Respectfully submitted,

HENRY WADE.
A. BLUE.

AGRICULTURAL HALL,
Toronto, January 16th, 1884.

REPORT OF FAT STOCK SHOW.

To which was awarded the First Premium by the Agriculture and Arts Association.

The first annual Fat Stock Show of Toronto, was held in that city, December 14th and 15th, 1883, under the auspices of the Agriculture and Arts Association of Ontario, and the Toronto Electorial District Agricultural Society.

The exhibition was held in the Commercial Hotel Stables, a very convenient place in many respects, being central, near the market, and suitable for the weighing of the many animals on exhibition. The stables were commodious but ill-adapted for the purpose. On entering the building one was at once convinced of the fact that the managers and directors had made the best of the accommodation afforded them. The animals were arranged around the wall in good order, leaving a long passage up the centre for the convenience of visitors. This space was well bedded with shavings, making a soft carpet for the animals to stand on during the judging. The judging ring was rather small, the animals when standing across it took up nearly all the width, leaving the judges scarcely room enough to get around; and still worse leaving very little room around the outside of the ring for the numerous visitors who were anxious to get a good view of the massive animals as they were brought into the ring.

The leading characteristics of the show, in the cattle line, were the large number of prime animals of good quality, all showing the characteristic points of the Shorthorn very distinctly, viz.: great size, length, breadth and depth of carcass; small in bone, fine in symmetry, attractive in colour, and an elegant, imposing contour, which, will ever place the shorthorns in high estimation amongst breeders, judges, and shippers. The most noticeable character of the show was the absence of all other breeds, shorthorns alone being exhibited, giving the exhibition a clannish appearance. Although the various other breeds may not attain to the great weight of the shorthorn, yet, I think it would add very largely to the interest and variety of the show if prizes were awarded to the separate breeds independent of each other; this would encourage the different breeders to exert themselves in the production of such animals as would do credit to breeders, and also, to the different breeds of cattle so well represented in some of our counties in Ontario.

The largest exhibitors are Messrs. H. and I. Groff, of Elmira, Waterloo county, Ont., who show fifteen head of well fatted animals, viz.: Three three-year old steers, five two-year old steers, and two one-year old steers; also, three four-year old and over cows, and two three-year old heifers. The display of such remarkably fine animals reflects credit upon the breeders, and also upon the Province, all going to show their good judgment in the selection of their breeding animals, and a thorough knowledge of the management of rearing and feeding them. In order to do these gentlemen justice in giving a report

of their excellent stock it would require a great deal more time than I had at my disposal while visiting the Fat Stock Show. They also exhibited two car loads shipping cattle; which on an average would be considered an even lot of animals. In passing over the different classes as they appear in the show ring I will endeavour to touch on the more important parts of each exhibit.

Messrs. J. and R. McQueen, Salem, made a very select and creditable exhibit viz.: One cow four years old, "7th Duchess," weight 2,250 pounds; two heifers three years old, "Daisy and Lily," weight 2,050 and 1,630 pounds respectively; and one steer three years old, "Red Duke," weight 1,925 pounds; also the well known "Duke of Athol," weight 2,500 pounds, sold for $300; this bull, by the way, is a descendant of the $46,000 cow New York Mills fame, has great length of frame, fine even loins, rather flat on shoulder, has great length of rump, and depth of fore-quarters. Jas. Russell, Brougham, exhibited one cow four years and over, a beast much praised by all who saw her, and well deserving of it. He also had a number of shipping cattle, six two-year old steers, one steer three years old, two heifers four years old, and one three years old. R. Telfer exhibited one steer "Sandy," three years old, weight 2,350 pounds, being the animal that balanced the scales with John Norris's "Riley." John Norris exhibited one steer four years old, "Riley," "Sandy" being his equal opponent. James Hunter, Alma, exhibited one cow, thorough-bred, a low set animal well filled out in every part, but not enough of her there. J. Kelly, Shakespere, exhibited one grade steer one year old, a promising animal of his age. R. J. Phin, Hespler, exhibited one cow, weight 1,970 pounds. Mr. Downing, Lambton county, exhibited three three-year old steers, and one heifer two years old, all of which produced a good impression. Mr. Gibson, Delaware, exhibited one steer, "White Duke," two years old, weight 2,110 pounds.

The weather during the day was all that could be desired, the ground being frozen over, yet partially thawed, leaving the roads and streets in good condition for the transit of animals without, danger of injuring their feet, and also enabling the exhibitors to have all their arrangements completed, ready for the judging.

In the afternoon the judges begun their duties. A large crowd of farmers and citizens gathered around the ring, all anxious to secure a suitable position where they could get a good view of the different classes as they were brought into the ring.

CLASS I.—Thoroughbred Cattle of any Breed.

Sec. 1. *Best steer or spayed heifer, 3 and under 4 years:—*

1st, H. and I. Groff, "Champion," .....1,342 days old, weight 2,200.
2nd, J. and R. McQueen, "Red Duke," ..1,336 " " 1,925.

In this class we were first introduced to the "Champion," a perfect type of the Booths' famous beefing breed, a steer of deep red colour, great length of frame, with width and depth in proportion; although he might be criticised as a little uneven, showing a tendency to lumpiness, yet every part was so well covered especially the choice parts for the butcher, that all who saw him considered him entitled to the first prize. His head might be considered a little coarse. "Red Duke," a very even steer throughout, but could not be considered a finished animal, showing good evidence of his capability of laying on a great deal more flesh. He had what might be called a little flabbiness on ribs, and did not show the proportion of carcass above the lines as "Champion." If he had been well filled he would have been a close rival.

Sec. 2. *Best steer or spayed Heifer, 2 and under 3 years:—*

In this section there was no competition, the "White Duke," the property of Mr. Gibson, Delaware, entered the ring amidst the applause of all the spectators. This famous animal is only 947 days old, and weighs 2,110 lbs, which entitles him to a few passing remarks. He was fed at the Ontario Experimental Farm, and is the heavest animal of his age in America. It reflects great credit upon the institution, and is also the accomplishment of what Prof. Brown has always advocated, as being the only true

road to fortune in the stall-feeding of animals, namely, Early Maturity. This massive animal is fine in almost every respect, there being no appearance of lumpiness, and every part well and evenly filled out. The head and fore quarters could well be pointed to as a model; nothing on exhibition could surpass him. If any deduction is to be made, it is in his hind quarters, as there is a noticeable weakness or tapering from the hind rib back, giving his hind quarters a wedging appearance. Had the good qualities of his fore parts extended all the way back, there is no doubt he would have won the sweepstakes of both Toronto and Guelph shows.

Sec. 3. *Best steer or spayed Heifer, 1 year and under 2 years:*—

1st, H. and I. Groff, "Baron," 545 days old, weight 1,220.

There was no competition in this section. He presented good lines, handled well, fine bone and symmetery and will do credit as a stall feeder for another year.

Sec. 4. *Best cow, 3 years and over:*—

1st, H. and I. Groff, "Maid of Honour 6th," 2,739 days old, weight 1,920.
2nd, J. Russell, "Fuchsia Duchess,".....2,645 " " 2,650.
3rd, H. and I. Groff, "Princess Louisa,"....1,714 " " 1,690.

There were five entries in this competition, and speculation ran high amongst outsiders, a great many thinking Russell's roan would win the contest; but before long the judges' good discrimination relieved them of any further speculation, when the prize was awarded to the "Maid of Honour 6th." a low-set animal, just what the butchers are in quest of. She has width, depth and thickness, without height: the lions and back ribs are built up with a great depth of flesh, making a noticable hollow in her back, which detracts a little from graceful appearance she would have otherwise have possessed. Russell's roan was what might be called coarse, having the appearance more of a bull than a cow. From the hooks she presented a very robund surface, with a broad, deep chest, giving plenty of room for lungs and heart action; her neck was rather muscular, and the attachment of the head not so clean as might be. The only glaring deficiency was in the rumps, which, if they had been well and evenly filled out, would have entitled her to the first prize. "Princess Louisa" is a beautiful dark-red colour, purely well got up in every part; but rather small.

CLASS II.—Grades or Crosses of any Breed.

Sec. 1. *Best steer or spayed heifer, 3 and under 4 years:*—

1st, H. and I. Groff, "Young Sherman,"..1,379 days old, weight, 2,120.
2nd, Wm. Downing, "Simon,".....1,095 " " 2,220.
3rd, do do "Romeo,".....1,100 " " 2,150.

"Young Sherman" might be considered a little coarse, great width of loin, well sprung ribs, rump rather short, fine muscular neck, gracefully coinciding with his shoulders, and a neat or clean attachment to head. "Simon" and "Romeo" come very little behind. The angular parts of their bodies were not so well rounded or smooth by breeding, with the general surface.

Sec. 2. *Best steer or spayed heifer, 2 and under 3 years:*—

1st, H. and I. Groff, "James,".....910 days old, weight, 1,930.
2nd, " " "Elmira,".....970 " " 1,930.
3rd, " " "Hopewell,".....910 " " 1,950.

In this class the judges were tested to their utmost, there being only a few pounds difference in the weight of the animals. If there was much difference in this lot of animals, it was not through the eye, but by the touch, that the nice discrimination of the superiority of one over the other was made.

Sec. 3. *Best steer or spayed heifer, 1 and under 2 years:—*

1st, H. and I. Groff, "Aberdeen,".....626 days old, weight, 1,420.
2nd, John Kelly, "John Cook,".....639 " " 1,410.

"Aberdeen" is a dark roan, almost approaching red. Although there was only ten pounds difference in their weight, yet the most casual observer could not help noticing the compact form and uniformity of frame, and acknowledging him superior to "John Cook." "John Cook" is a fine, lengthy animal, but presents a noticable want of finish in the twist, not well ribbed home, a little flabby, and a want of that quick, elastic touch, which sends a thrill of pleasure through the butcher.

Sec. 4. *Best cow, 3 years and under:—*

1st. J. and R. McQueen, "Daisy,".....1,335 days old, weight 2,050.
2nd. H. and I. Groff, "Blossom,".....1,707 " " 1,930.
3rd. J. and R. McQueen, "Lily,".....1,402 " " 1,630.

"Daisy" is a high graded animal, even and close set, a little slack on the back; rumps, not so well covered as I would like; although very little fault could be found with her general harmony of parts; and although she attained the great weight of 2,050 pounds, yet her whole surface was so even, without showing any bony prominences, or coarsness to detract from the general impression of compactness, substance and symmetry, that marks the perfection of useful beauty.

This closed the judging for the afternoon, arrangements being made to resume it again in the evening. The sweepstakes animals were called out, but on account of something being wrong with the engines, the electric light was a partial failure, and the judges had to postpone it until the morning. The sudden change of weather from autumn to winter, prevented a great many from attending, who would otherwise have been present. Notwithstanding these drawbacks, it was comfortable inside the stable, and all things went cheerily; the band relieving the monotony by rendering very lively and appropriate music, which seemed to give the animals a lively appearance and make them show to advantage.

CLASS III.—Sweepstakes for Cattle.

Sec. 1. *Best steer or spayed heifer of any age or breed:—*

In this contest there were eight entries, and I think a finer lot of animals has never been exhibited in the Dominion than stood in the ring. A book on the merits of the shorthorn could be written on them. I think the only satisfactory test of the merits of those fine animals could be when they reach their destination on the *block*, where the relative development of the most valuable parts can be readily demonstrated. "Champion" however, justly carried off the prize.

Sec. 2. *Best female of any age or breed:—*

In this contest J. and R. McQueen's "Daisy," H. and I. Groff's "Maid of Honour," and John Russell's "Fuchsia Duchess" entered the ring. The "Maid of Honour" carried off the honours again. Her merits were discussed previously.

CLASS XII.—Special Premiums.

Sec. 1. *Best fat Shorthorn steer or cow of any age.—A Cup, value $100, presented by John Hope, Esq., of the Canada West Farm Stock Association on behalf of the Shorthorn breeders of Ontario.*

In this competition "White Duke," "Red Duke," "Champion," and "Fuchsia Duchess," entered the ring. "Champion" is again the hero, showing the largest proportion of carcass above the loin, which is best for the purposes of the butcher. All these large

animals were fine boned which is an indication of good feeding quality, early maturity and superior grained flesh.

Sec. 2. *Special Premium offered by G. F. Frankland, Esq., of Toronto, for the best car load of ten fat animals any age, sex, or breed, and also a 2nd Prize, offered by the Directors.*

There were three lots exhibited. The first prize being secured by H. and I. Groff, and 2nd by Britton Bros., Toronto.

Sec. 3. *John Holderness, Esq., Toronto, a Prize of $50 for the best fat beast on the ground of any age, breed or sex.*

H. and I. Groff's "Champion" took the prize again.

Sec. 4. *By Andrew Smith, V.S., of the Veterinary College, Toronto, a $25 Prize for heaviest fat steer of any age or breed.*

Five entries were made. John Norris's "Riley," and R. Telfer's "Sandy," both being of the same weight, the judges decided to divide the money between them.

Sec. 5. *This Prize was offered for the best herd of fat cattle for shipping, offered by the Empire Horse and Cattle Food Company, of Mitchell, Ont.*

There were two entries—J. and R. McQueen's "Red Duke," "Lily," and "Dairy," and H. and I. Groff's "Sherman," "James" and "Hopewell." H. and I. Groff carrying off the prize.

Sec. 6. The last competition was for a *$50 Prize offered by the Thorley Horse and Cattle Food Co., Hamilton, for the three best steers under 4 years of age.*

Groff's "Waterloo," "Elimira," and "Champion," securing the prize without any competition.

Sales.

Most of the cattle sold readily at good prices, some at extraordinary figures. Mutton was not much in demand, notwithstanding that Mr. Kelly slaughtered and dressed a fine two-year old sheep which was delicious looking enough to tempt the palate of the most scrupulous. W. Ryan, Esq., purchased "Riley" from John Norris, for the sum of $200, weight 2,350 pounds. Mr. Downing purchased Groff's "Champion," "Elmira," and "Waterloo," at 12½ cents per pound. but afterwards sold them again. Groff's "Maid of Honour" was sold to G. F. Frankland for 12 cents per pound. Also "Princess Louise" to R. R. Carker, Bowmanville, for 12 cents per pound. "Punch" was sold to Mr. Hugh Kelly for 9 cents per pound. Thompson and Sons purchased "Young Sherman," "Hopewell," and "Blossom," from Groff's herd at 9½ cents per pound. Twenty-two other animals of Groff's sold to Hugh Kelly for 6 cents per pound. Gibson's "White Duke" was sold to G. F. Frankland for the sum of $300. Russell's "Fuschia Duchess" was sold for $300 to Britton Bros. McQueen's bull "Duke of Athol" was purchased by Mr. H. Kelly for the sum of $200, to distribute among the poor for a Christmas dinner. Altogether the results of the sales were satisfactory to the stock raisers giving them strong encouragement to go on with their good work, which I have no doubt will tend to increase the interest and popularity of Toronto's Christmas Fat Stock Show.

Sheep.

In sheep the exhibit was very fine, if quality of animals, without numbers, be considered; though, I am sorry to say, some of the breeds were poorly represented, especially amongst the Downs.

Geo. Hood, of Guelph, exhibited four different breeds, viz.: Cotswold, Leicesters, Oxford grade and Shropshire grade, eight of which were shown in the Middle Class and five in the Long-wool Class. He also had twenty sale sheep, among which were Merino grades, which added to the variety. The largest exhibitor was Mr. John Rutherford, of Roseville, P.O., Waterloo. In the long-wool class he exhibited three two-shear wethers, average weight 355 lbs., and a shearling wether 155 lbs.; ewes, two-shear, one ewe weighed 340 lbs.; ewe, one-shear, weight 150 lbs.; also two one-shear wethers, weight 255 lbs. In the middle-wool class he exhibited a two-shear wether, weight 265 lbs., and in the one-shear, two exhibits, one weighed 255 lbs.; the two last mentioned are Southdown grades, the rest are Border Leicesters. John Kelly, jr., Shakespeare, shows a fine lot consisting of two ewes, one-shear, weight 262 and 242 lbs. each; also a wether, under one year, weight 174 lbs., and a ewe lamb, weight 162 lbs. John Dryden, M.P.P., Brooklin, Ont., makes a good exhibit of two Shropshire Down ewes, one in particular is a beauty with a close crop of medium wool of fine texture and average lustre, the other has what might be termed a dry puffy fleece. J. E. Rudd, Guelph, shows fine crosses between Oxfords and Cotswolds—exhibiting in long-wooled class two wethers one-shear, and in medium-wool class four exhibits.

In the sheep I think it unnecessary to quote the prizes, as we were so busily taken up with the cattle that it was impossible to take notes on the judging of the different classes of sheep, so we could not criticise the judges' decision, besides, the stables were too dark to make a comparison.

Pigs.

The number of exhibits were small but very good, the stable being rather dark to make any minute examination of them. The prizes were awarded as follows:—

Hogs, any breed: Best barrow, one and under two years, 1st, 2nd and 3rd, Wm. Harris, Toronto. Best barrow, under one year, 3rd Joshua Sisley, Richmond Hill. Best sow, one and under two years, Robert Dorsey and Son, Summerville; Joshua Sisley, 2nd; Jos. Featherston, 3rd. Best sow, under one year, Geo. Savage, Burnhamthorpe; Jos. Featherston, 2nd.

Sweepstakes for Hogs: Best hog, any age, breed or sex, Robt. Dorsey and Son, Summerville.

Poultry.

The live poultry exhibit was small, but a fair lot of birds. The dressed poultry was remarkably good and well arranged, showing each exhibit off to advantage.

Benefits of Fat Stock Shows.

Fat stock shows are very beneficial to the community at large. They encourage the stall feeding and maturity of animals at an early age, enabling the stall feeder to turn a greater number of animals off his hands in a shorter time, with less cost for feed and attendance; which, taken over a number of years, means a small fortune to a large stock feeder. Fat stock shows are also beneficial from an educational standpoint, acquainting the numerous visitors with the different breeds of cattle, sheep and pigs, and their ability to put on flesh at certain ages, and their time of maturity. They also act as a stimulus in the greater care and selection of such animals as will be likely to do well in the show ring and also be profitable as breeders.

Fairs should not be looked upon as a time and place to gather for amusement and idleness; the young men of our land cannot afford to be idle while they are attending or visiting such a show as was held in Toronto. There is a great deal to be learned by seeing, handling, and judging the many different classes and breeds of live stock that are generally met with at our fat stock shows; and to see, handle, judge, and admire such fine animals creates a desire to possess such, and to improve our herds and try to work them up to a standard of excellence that will do credit to the exhibitor and exhibition.

Buildings.

In order to make fat stock shows successful and interesting, it is necessary to have suitable buildings, arranged in such a manner so that all the different classes of animals may be classified and each class together. By having them so arranged it will save a great deal of questioning on the part of visitors, in endeavouring to find out animals' ages and breed. I also think it necessary to have proper accommodation for the slaughtering and dressing of animals fit for the market, which would add greater interest, especially amongst those who would be competing with other breeds against the shorthorn. With accommodation such as I have described, Toronto need not fear for the success of her fat stock shows, but may look forward with just anticipation of becoming second to none, either in Canada or America, in the production and exhibition of animals that would do credit in any show ring in the world. It will also awaken the farmers up to a realization of their position, which will spur them on to greater exertions in the breeding, rearing, and fattening of animals at an early age.

I have the honour to be,

Your obedient servant,

Wm. Little.

Ontario Agricultural College, December, 1883.

REPORT OF FAT STOCK SHOW,

To which was awarded the Second Prize by the Agriculture and Arts Association.

To the President and Members of the Council of the Agriculture and Arts Association:

Toronto Fat Stock Show.

The initiatory Christmas Fat Stock Show of Toronto was held in that city on the 14th and 15th Dec., 1883, under the auspices of the Agriculture and Arts Association of Ontario, and of the Toronto Electoral District Agricultural Society.

It was a decided success, and reflects great credit upon the Committee of Management, on which we find men who combine in themselves the capabilities of stock-raisers and of good business men, no doubt one of the reasons why everything ran so smoothly.

The stables of the Commercial Hotel, on Jarvis St., were fitted up, and, for the poor foundations the managers had to start on, the result of their labours were really very good. A yard was roofed over, with large skylights left for the admission of light, and this part of the building was very tastefully decorated with evergreens, the ground nicely covered with shavings, and comfortable stalls fitted up.

The finest cattle were grouped in this apartment, and every arrangement that would conduce to their comfort was carried out. In regard to the stables proper, not much could be expected of them; they were dark, requiring artificial light throughout the whole day, so preventing a very close inspection of the animals within them. However, as very few of the show animals were there, the new room being large enough for their accommodation, there was not much inconvenience felt. The worst feature about the arrangement was the insufficient space for a suitable ring for judging purposes. Although there were very few visitors for a city of Toronto's dimensions, yet there was great difficulty in getting animals in and out of the ring, and by the time six or seven head had reached the inside, there was a blockade there also. But such inconveniences are small matters, and no doubt, ere another year has passed by, Toronto will be prepared to give the magnificent animals that flock to its second Christmas show, a more roomy reception.

The sheep, pigs and poultry were very comfortably located, sharing one of the apartments with some ten cattle brought in for the car load competition. The dressed poultry was arranged on a table in the middle of the room, and presented a beautiful spectacle, as it lay there tastefully garnished, calling to mind the festivities of the season approaching more vividly than any other part of the exhibiton.

During the evenings the buildings were partially lighted by electric light. It is much to be regretted that the working of this was not carried on satisfactorily, as considerable inconvenience was felt by its going out several times, at inopportune moments.

The weather during the first part of the show, and for some days previously, was highly favourable to the health and comfort of the animals ; a most cheerful atmosphere, with just a touch of frost, prevailing. The morning of the second day dawned cold and windy, but, thanks to the provisions that had been made for the protection of the stock, it was none the worse ; so the weather on the whole can be described as having been propitious; close damp air being the condition that most effects our domesticated animals.

Many of the cattle and sheep there had been at shows immediately before ; the Messrs. Groffs' lot for instance, coming part by way of the Woodstock Exhibition, and part being at Guelph on the 12th and 13th inst. The worry attendant on being exhibited, and on the travelling necessary, went much against the appearance and weight of the animals ; but even under these unfavourable circumstances, every one united in saying that such a fine collection had never been seen in Toronto before.

The total number of cattle on the premises was something over eighty. Only thirty-one were entered for competition ; the rest being merely brought in to compete for car load prizes , and to advertise themselves among the numerous buyers inspecting the show.

Messrs. H. and I. Groff, of Elmira, showed fourteen head for competition, besides twenty-two others in for car load competition. These enterprising men have this year probably the finest lot of animals ever taken to an exhibition of this kind in Canada by a single firm. The prize lists go far to prove this supposition correct. They took no less than seventeen prizes. All the special prizes but one fell to their favoured lot, making five special prizes, six firsts, two seconds, and two thirds ; in addition to this they took the sweepstakes prize for steers, and also the one for females.

Can any one beat this with fourteen animals ?

Messrs. J. and R. McQueen, of Salem, Wellington, exhibited four head ; a three-year old steer, a cow and two heifers, and also had for sale their six-year old Shorthorn bull, "Duke of Athol," until lately the leader of their well-known herd. He turns the scales at 2,470 lbs., and with his splendid make-up is an object worthy of admiration.

Mr. M. M. Downing, of Thedford, Lambton, has a herd of four, a heifer and three steers, one of which he got from Mr. Rudd, of Guelph, an animal that took a third prize there on the 12th.

Mr. Russell, Pickering, Ontario, showed a four-year old heifer of large dimensions, weighing 2,650 lbs. She took the blue ribbon in competition of "Best Thorough-bred Cow, three years and over."

She has a Booth pedigree, tracing back to the ninth dam, and is a good illustration of a shorthorn ready for the shambles.

Mr. Russell also sold ten head to Britton, Bros., of St. Lawrence market, who exhibits them in their name. A lot of cattle remarkable for their even excellence, consisting of six two-year old steers, two four-year old heifers, and a steer and heifer each three years old. They took second prize in the ring, for best car-load of ten fat cattle.

Mr. J. Norris shows his steer "Riley," 1,714 days old, weighing 2,350 lbs.

Mr. Hunter, of Alma, Wellington, exhibits a four-year old heifer, that took the sweepstakes at the Elora fair, on the 18th inst. She is rather on the small side, her weight being only 1,330 lbs. ; but for general build and distribution of meat over the prime parts of the carcass, she takes a high rank. She is very prime, and may well be described as a big little beast.

Mr. R. J. Phin, of Hespler, Waterloo, shows a six-year old cow, noteworthy from the fact that she was the only animal saved from the burning of that gentleman's barns about a year ago.

J. Kelly, Jr., of Shakspeare, Perth, has a yearling, "J. Cook" by name, weighing 1,410 lbs., a fine lengthy animal, but rather loosely built, with a lack of depth and width behind, and a flabbiness of touch. It is rather hard to critise severely so young an animal; for another year's feeding would no doubt make a wonderful difference. Though not at all finished, he presents a great weight for his age.

Mr. Telfer, Burgoyne, exhibits two grade steers. One is a three-year old, weighing 2,350 lbs. This animal took part of the prize for "Heaviest fat beast on the ground." He has great size, by dimensions in length and height.

If criticised he would be found rather narrow, and without that spring of barrel that so helps the appearance of a cattle beast. The other steer is two years old, weighing 1,700 lbs.

Mr. R. Gibson, of London, has the "White Duke;" a steer 947 days old, and weighing, after all the hardships and worry attendant on three days of exhibition, and sixteen hours spent in a cattle-car, 2,110 lbs. He is a splendid example of prematuring, and shows what thorough-bred shorthorns, under favourable conditions, can be made to do. In regard to his special build: He carries a truly typical head, and has a development of neck and fore-quarters unequalled. If he only carried his grandness back with him he would indeed be a wonder; but, like everything else not divine, he has his weak points, and these we find in his lack of depth of twist and flank, and want of width at the pin bones, the massiveness of his fore parts making these slight deficiencies more apparrent. The fine bone and beautiful chiselling of head and horn indicate clearly his breeding, and the touch, though not up to what is desired, indicates a fair quality of flesh. This animal was bought by Mr. Hope, of Bow Park, when about nine months old; and a few months afterwards was sold to the Ontario Experimental Farm, where he has been fed since then up to date.

In addition to above named exhibitors, Mr. Oliver, of Brantford, had in ten two year old steers, described by himself, as "a lot of average export cattle." Two or three of them were very well made, and well done to animals, one especially would have made a very creditable show in the ring had he been entered.

There are also eight three-year old steers and two cows belonging to Mr. Fisher, of Halton, brought in merely for advertisement and to compete for car load prize.

The list of prizes for cattle was very complete; and they were of a sum well worth trying for. All the sections were not filled; two or three animals taking off prizes without any opposition whatever; and in some other cases, no more than two cattle being entered, only first and second prizes were given.

The Judges were, Messrs. George Hood, of Guelph; Morgan, of Oshawa; Rawlings, of Ravenshoe; and Howden, of Peterborough; gentlemen well known through the Province, in connection with live stock.

Previous to entering the ring, all the cattle were taken to the market scales and weighed, enabling the judges to take their accurate weight into consideration when giving their decision, if they so desired.

The first class was for "Thorough-bred cattle of any breed."

In Section One (Best steer or spayed heifer, three and under four years), there were two entries. "Champion," H. & I. Groff, took the first prize. He is a truly grand beast, and unless we are critical, his faults would not be noticed. A little coarseness about head and horns shows character, and is in keeping with his massive fore-quarters. As we come back, we find a magnificent spring of rib, and a fairly good touch. Behind the hocks, we note the slight patchiness of flesh and the quick falling off of thighs—very natural weaknesses in so prime an animal.

He was first sold to Mr. Downing, and afterwards passed into the hands of Mr. Mallon, of St. Lawrence Market, at somewhere about thirteen cents per pound.

"Red Duke," J. & R. McQueen, took the blue ribbon in this section. Having been fed only about ten months, he does not show the primeness that characterized his successful opponent. He is, however, a much evener animal, and if he had been under the same management as "Champion," would have been hard to beat. He shows character about the head, is a good handler, and evinces remarkable smoothness throughout.

In Section Two (Best steer or spayed heifer, two and under three years), the "White Duke," R. Gibson, carried off the prize without opposition.

In Section Three (Best steer or spayed heifer, one and under two years), "Baron," H. & I. Groff, took first, like the last, without competition. "Baron" is a well finished animal for his age, with rather a leaden touch and slackness behind; but likely to improve as he grows.

In Section Four (Best cow, three years and over), a remarkably fine lot of females were brought out, and the competition was keen.

"Maid of Honour," H. & I. Groff, very justly took the first prize. She is the primest animal on exhibition, and for width, depth, thickness, and general evenness, stands unmatched. The filling of flank and twist is remarkable, and not equalled even by any steer at the show. In fact, judging her from a steer's standpoint, we can find no fault, except that the shoulder wedges into the neck very rapidly; hardly to be considered a weakness in a cow with such development of shoulder and crops. The dishing in the loin is due, not to an insufficiency of flesh on its centre, but to a development of meat at its edges, rarely found. The firm elastic touch here and in other places indicates her superior quality.

"Fuchsia Duchess," J. Russell's big heifer comes second.

"Princess Louisa," H. & I. Groff, takes a third place.

The next class was that of Grades and Crosses of any breed.

In Section One (Best steer or spayed heifer, three and under four years), "Young Sherman," H. & I. Groff, takes the red ribbon. He is remarkable for his muscular neck, harmoniously winding, and the length and depth of his hind-quarters; also, the way he carries his width out and down. His weight is 2,120 lbs. A coarseness of bone is discernable, but seems almost necessary for the upbearing of his weight.

The second prize was carried out by "Simon," a steer of 2,220 lbs., owned by M. M. Downing. This gentleman again took the third prize with "Romeo;" weight 2,150 lbs.

The entries in this section numbered five, and the prize takers were hard pressed, but justly successful.

Section Two (Best steer or spayed heifer, two and under three years). In this section also there was very keen competition. After a lengthy discussion, judgment was finally given, as follows: "James," H. & I. Groff (weight, 1,930 lbs.), was declared first. He indicates by his handling a quality very seldom found, the mellow firmness of the touch, combined with the elasticity, sends a thrill of delight through the handler, and causes the buyer to give ungrudgingly a cent per pound more than he otherwise would have. In regard to his build, he possesses an evenness and rotund fulness; but without any remarkable development. His perfect top and bottom lines, the set on of his neck and head, and the blending of these into each other and into the shoulder, gives him a carriage and style that fills the eye with delight fully. He was one of twins, bred by Mr. Miller, of Guelph, and afterwards bought and fed by the Messrs. Groff. He was the sweepstakes animal at the Guelph Show.

The second prize was given to "Elmira," H. & I. Groff, a steer weighing 1,930 lbs.

For the white ribbon, "Hopewell," the twin brother of "James," was successful. He exceeds his brother in weight, but cannot show his quality or evenness.

In Section Three (Best steer or spayed heifer, one and under two years), "Aberdeen," H. & I. Groff, took the first, and "John Cook," J. Kelly, the second.

In Section Four (Best cow, three years and over), the red ribbon was carried off by "Daisy," J. & R. McQueen; an animal coming close to Groff's "Maid of Honour" in excellence. Her chief fault is a roughness behind the hocks, caused by a poor joining of tail and spine. The shoulders is not very thickly covered; but the crops are magnificent, having a fulness far ahead of any other animal shown.

"Blossom," H. & I. Groff, took the second prize, and "Lily," J. & R. McQueen, the third.

There were seven entries in this section, and judging for second and third prizes was difficult.

The third class consists of the prizes for sweepstakes cattle.

In Section One (Best steer or spayed heifer of any age or breed), there were four entries:

"Riley,"	1,714 days old,	2,350 lbs.....	.....J. Norris.
"Champion," ..	1,342 "	2,200 "	H. & I. Groff.
"James,".....	1,038 "	1,930 "	"
"White Duke,"	947 "	2,110 "	R. Gibson.

"Champion," after a lengthened judgment, was given the red ribbon.

A protest against the decision was entered by Mr. Gibson, owner of "White Duke."

In Section Two (Best female, any age or breed), there were three entries. "Daisy," McQueen; "Maid of Honour," Groff, and "Fuschia Duchess," Russell. "Maid of Honour" took the prize.

In the Special premiums, the first one, given by the Shorthorn breeders of Ontario, was a cup, value $100. It was won by "Champion," H. & I. Groff.

The next, given by G. F. Frankland, Esq., for "Best car-load of ten fat cattle," was taken by H. & I. Groff, with a herd, with their three-year old steer "Punch" at its head.

The second prize for same exhibit, given by the Committee, was carried off by Britton Bros., with ten animals; though not prize-takers individually, yet, as a whole, they were far above the average in evenness and quality.

In the prize for the "Best fat beast on the ground, any age, breed, or sex," given by J. Holderness, Esq., Toronto, "Champion," H. & I. Groff, again came forward and was triumphant.

For the "Heaviest fat steer or cow of any age or breed," given by Professor Smith, of the Veterinary College, there was a tie. Telfer's "Sandy" and Morris' "Riley" each weighing 2,350 lbs., the prize was divided between them.

The prize given by the Empire Horse and Cattle Food Co., of Mitchell, Ont., for the "Best herd of fat cattle for shipping," was taken by H. & I. Groff, with their steers "Young Sherman," "Hopewell," and "James." There were only two herds competing for this, as the conditions required, that the food fed for four months previous to Show, must have been seasoned with the condiment manufactured by this firm.

That given by the Thorley Horse and Cattle Food Co., of Hamilton, was taken also by three animals of the Messrs. Groff's herd, namely "Champion," "Elmira," and "Waterloo."

Sheep.

The exhibit of sheep was not large, being much fewer in numbers than the cattle; but there were some fine animals in it.

The two sweepstakes especially were of a stamp not often found among the flocks of Ontario.

The principal exhibitors were:—

J. Kelly, Jr., of Shakspeare, Perth, who had four head of thoroughbred Border Leicesters, two lambs and two shearlings. He took with them three first prizes.

Geo. Hood, Esq., of Guelph, had on the grounds altogether thirty-one head. Twenty of them, however, were not entered for competition, being merely held for sale. He shows representatives of Cotswolds, Leicesters, Shropshire grades and Oxford Down grades; and takes the sweepstakes for best ewe, as well as two first prizes, two second, and a third.

J. Rutherford, Roseville, exhibits eleven head, of various ages. The average weight of his two-shears is 328 pounds, that of his shearlings 245 pounds, and his lambs weigh, on the average, 153 pounds.

He has the sweepstakes for best wether; three first prizes, three second, and one third.

J. Dryden, M.P.P., Brooklin, Ont., shows two thoroughbred Shropshire ewes; one of them took a second prize and the other a third. They were in competition with some very fine animals. The word magnificent is not a bit too strong for the first prize animal in this class.

Jas. G. Wright, of Guelph, Wellington, exhibits six head, two in the long-wool class and two in the medium. He took with them one red ribbon, two blue and three white.

As there were no facilities for slaughtering in the building, there were hardly any entries for "Dressed Carcasses," and no beef or pork was killed at all.

Mr. Hugh Kelly, who bought some of Mr. Hood's sheep, killed the sweepstake's ewe, an Oxford Down that took the first place at Chicago last year, and was probably one of the finest sheep in the Dominion. She dressed extremely well, and the carcass was much admired. She was two years old, and bred at the Ontario Experimental Farm.

Hogs.

Among the exhibitors were Joshua Sisley, Richmond Hill; George Savage, Burnhamthorpe; Joseph Featherston and R. Dorsey & Son, Summerville; and Wm. Harris, Toronto.

R. Dorsey & Son were the winners of the sweepstakes.

Poultry.

Among the poultry the principal exhibitors were Jos. Tomalin, Brampton; R. Dorsey & Son, Summerville; and Mrs. Card, Guelph.

Jos. Tomalin was the largest prize-taker, getting eleven prizes. He took one for the best display of live fat poultry; one for the best dressed hen; another for the best dressed pullet; and one for the best display of dressed poultry. This gentleman deserves great credit for his efforts in this line, and it is to be hoped that others will follow his example.

Mrs. Card, of Guelph, took eight prizes, and had a very dainty show. R. Dorsey & Son took only four ribbons, but they were well earned.

Some people may question the uses and advantages of such an exhibition; to the enquiring mind these are very apparent and very wide spread. The stock-raiser by these shows is stimulated to greater endeavours in the production of choice beef, and the extra price for it gives him larger profits than usual. This beef, by passing through the butcher's hands, gives him greater gains than poor beef does. And, lastly, the consumer feels the benefit of the superior quality of his roast, by his freeness from indigestion, etc., so increasing his health and happiness.

But, apart from this view, great good is derived from these annual shows. They will help to make the production of beef and mutton a specialty, in which capacity it can only attain perfection; no man who follows mixed farming can bring one branch of his business to its highest, without neglecting some of his other work, thereby entailing more or less loss. Agriculture, when including stock-raising, etc., is much too wide a profession for one man to hope to grapple with successfully; and the day is not far distant when in Canada, as well as in Europe, each man will take a special line of business.

Much instruction is to be got from attending shows. The question of early maturity, profitable feeding, cost of production, etc., are placed before the observer's eyes by living examples, which speak more plainly to interested enquirers than pen and paper ever can.

The cattle man meets here his fellow-labourers from different parts of the country; sees the result of their management, and finds out what position in the business he occupies himself.

As the show grows the capabilities of the different breeds under varying circumstances will be found out, and by noting the experience of others the novice in the trade will find a quicker way to wealth than if left to experience; will most undoubtedly increase the prosperity of the country.

Toronto, as the principal city and centre of Ontario, has in this work a great mission to perform. What she has done this year is the beginning, we all hope, of a great institution, which in a few years will make the name of this Province stand before the world as the great beef centre of America, and will make her own name even more illustrious than that of Chicago at the present day.

I have the honour to be, gentlemen,

Yours obediently,

W. W. Hubbard.

O. A. C., Guelph, December, 1883.

REPORT OF FAT STOCK SHOW.

To which was awarded the Third Prize by the Agriculture and Arts Association.

To the Secretary of the Agriculture and Arts Association of Ontario:

Toronto's Fat Stock Show.

On Friday, the 14th of December, Toronto's first annual Fat Stock Show was opened, under the auspices of the Agriculture and Arts Association and the Toronto Electoral District Agricultural Society. The morning was all that could be desired, being mild and autumn like, which made it very pleasant for those bringing in animals to the show. Early in the forenoon, the competitors began to arrive with their exhibits, and for a time all was confusion and bustle, in the stables of the Commercial Hotel, Jarvis Street, where the show was held.

The building is not at all adapted for a show of this kind. It was not large enough, and it is poorly lighted; but it was the best that the promoters of the show could secure; and under their judicious management, it was made to answer the purpose well.

The building was divided off into three compartments; in the northern one stood the competitors for the Association's prizes; in the middle one was a large number of shipping cattle, some of which entered the ring for special prizes, while in the southern compartment we met the remainder of the cattle, and also the sheep and the hogs, while on a table in the centre of this stable, we found the dressed poultry laid out in state, while their more fortunate brothers and sisters were caged in boxes underneath.

The floors of the building were strewed with a layer of clean chips, the posts and framework handsomely adorned with evergreens; hay was to be had overhead and water in a corner below, and everything that would tend to promote the comfort of the animals, was attended to by the management.

Exhibitors of Cattle.

The herds of some of the principal stock-raisers of Waterloo, Wellington, Brant, Perth, Lambton, and Ontario counties, were well represented. H. and I. Groff, of Elmira, Co. Waterloo, take the lead both in quality and number of exhibits. They had thirty-six head on the ground, thirteen of them entered in competition for the prizes offered by the Association, the remaining twenty-three were brought for the car load competition, a few of which competed for special premiums. The first thirteen were a remarkably fine group of animals. Four of them were Shorthorns, the remainder were high grades of the famous Booth strain. H. and I. Groff deserve special notice for their enterprise. They are evidently the most successful feeders in the Province. Take away their stock from the grounds, and we remove one-third of the exhibits. One cannot fail to be attracted by the symmetrical form, the evenness throughout, and the grand silky mossy coat of hair, so indicative always of quality, which characterizes the majority of Groff Bros. animals.

Richard Gibson, of London, exhibits his famous steer "White Duke," which was highly spoken off by the various cattle dealers on the grounds. This handsome, majestic looking animal, was fed at the O. E. F., Guelph, and is the heaviest steer of his age in Canada. J. and R. McQueen, of Salem, Wellington, show four head; one thoroughbred cow, one grade steer, and two grade heifers. Their three-year old heifer "Daisy" is a perfect daisy.

The herds of all the following gentlemen were represented, viz: Messrs. Downing, of Thedford, Co. Lambton; Hunter, of Alma, Co. Wellington; Telford, of Burgoyne; Kelly, of Shakespeare, Co. Perth; Phin, of Hespeler, Co. Waterloo; Oliver, of Brantford, Co. Brant; Russell, of Pickering; and Norris, of Ravenshoe.

There were on the grounds, at noon on Friday, eighty-two horned cattle, eight of

these were thorough-bred Shorthorns, all the others were grades of the same breed. Thirty-one of them were shown in the ring, as competitors for the prizes offered by the Association, some of the others for special premiums.

The weighing of cattle commenced at eleven a.m., but it was in the afternoon that the greater part of it was accomplished. The lightest animal was H. and I. Groff's "Baron," one year old, and weighing 1,220 pounds. The heaviest were, Mr. Norris's "Riley" and Mr. Telford's "Sandy," each of which weighed 2,350 pounds. The total weight of the twenty-eight animals, that were brought to the scales was 52,705 pounds, or an average weight of $1,882\frac{3}{10}\frac{2}{0}$ pounds per animal. The heaviest steer of his age on the ground, was Mr. Gibson's thorough-bred shorthorn steer, "White Duke," 947 days old, and weighing 2,110 pounds, or an average of two and a-quarter pounds per day, nearly.

At three o'clock the confusion of the morning was all over, and the various animals occupied the stalls that were assigned to them for the next two days.

The judging of cattle now commenced. The following were the gentlemen appointed for the task: Mr. George Hood, of Guelph; Mr. Morgan, of Oshawa; Mr. Rawlings, of Ravenshoe; and Mr. Howden, of Peterborough; all of which have had years of experience in the handling and judging of fat stock. But I doubt if in all their experience they found more difficulty in deciding between the merits of two animals, than in some instances at this show; many of them, in the different sections of each class, were so much alike, and possessed such a high degree of goodness, that none but the best trained eye and hand could tell which animal merited the prize. But, although the task was a difficult one, these gentlemen were equal to it, and with but one exception, gave satisfaction to all. While the judges were at work, a large crowd of interested spectators collected around the ring, striving to obtain a view of the fine massive animals as they passed in and out. Few but the front rank, however, were able to obtain a glimpse of them, save a few lucky individuals over six feet high.

At half-past four, the judges retired, to resume their task at eight o'clock p.m.

A great change had taken place in the atmosphere during the afternoon, but in spite of the cold gusts of wind that swept the streets, a large number turned out to visit the show, and to see the judging completed. But unfortunately the electric light would not work to satisfaction, and eventually it struck altogether, leaving us in darkness. All was now silence, save a band of musicians who had been favouring us with music all evening from a perch behind the evergreens overhead, and who now struck up a gallop as the crowd were dispersing.

Saturday Morning.

This morning the judging of the cattle was completed, and that of the sheep and hogs was also overtaken. And it now remains for me to give the prize list, and a few special notes on some of the more important cattle, I might here note, that first prize animals received a red ribbon on leaving the ring. (Prize list same as official list.)

We will now notice more particularly some of the prize animals, commencing with H. and I. Groff, of Waterloo, who carried away the lion's share of the prizes. Their thorough-bred steer, "Champion," well merits his name. He carried away four first prizes, and also the $100 cup. A remarkably fine animal, and what strikes one as being his most remarkable features are his grand development of rib, great maturity, wealth of flesh and fineness of bone. He is straight in his top lines, and stands well on his legs. If we might find fault, we would speak of a rather narrow hind-quarter and horns on the heavy side.

"Maid of Honour" is a chunky, low-set animal, with a grand, silky mossy coat of hair. She is very compactly built, carrying her breadth well down, but has a slightly dished loin. An almost model animal.

"Baron" is a lengthy yearling, with a somewhat flabby touch, rather coarse bone, and lacking in depth of twist; but is likely to improve with age.

"Young Sherman," a first prize animal, has a fine girth, full muscular neck, great bredth of loin and twist, but is apparently rather coarse of bone for our purpose.

"Jim," let us notice his fine coat of hair, a touch that cannot be excelled, prime and even in flesh : altogether a well finished steer, and ready for the butcher's block.

"Young Aberdeen" is one of Groff's red ribbon animals. He is very uniform and compact. Would like more depth of twist and flank.

We will now leave Groff Bros., who carried away nine first prizes, one second, and two thirds, and the Shorthorn cup, valued at $100, or sixteen prizes in all, amounting to $605.00.

J. and R. McQueen, of Wellington, exhibit four head.

Their three-year old steer, "Red Duke," is a very even, finely proportioned animal, lacking only in width of fore-quarters. He, however, was not finished, but can stand another six months' feeding with advantage.

"Daisy," a three-year old heifer, has fore-quarters that cannot be beaten for width or depth ; is prime and even in flesh. Her weakness lies in a narrow hind-quarter.

Richard Gibson, of London, exhibits "White Duke," a two-year old Shorthorn steer, fed at the O. E. F., Guelph. Notice the model head, the fine attachment of neck and shoulder, the extraordinary development of crops, the grand spring of his ribs, the prime quality, the great wealth of flesh and the fineness of bone. Shall we speak of narrow rumps? Yes ; but his extraordinary development elsewhere makes him to appear poorer here than what he really is.

Mr. Downing's "Simon" and "Romeo" have grand frames for carrying flesh, but are not well finished.

Mr. Hunter, of Alma, Wellington, exhibits a Shorthorn cow with great width and depth of frame, even in flesh and primely finished. A big little beast.

"Riley," showed by Mr. Norris, was rather leggy, and not well ribbed home ; but was evenly fleshed, and had great width and depth of fore-quarters.

"Fuchsia Duchess," an animal with a long pedigree, exhibited by J. Russell, Esq., of Pickering, is noticable for her great depth of body. Her rumps are too wedgy, however, and handling quality not good.

The remaining cattle in the ring, while worthy of special commendation, were generally more uneven, and had not the wealth of flesh on loins, back and ribs, that characterized the others.

Sheep.

The sheep on exhibition were a very prime lot. The largest exhibitor was J. Rutherford, Waterloo. He shows fifteen head. In the long-woolled class, nine head, and in the short-woolled, six. Most noticeable among his flock was a pen of three sheep, crosses between Southdown rams and Leicester ewes. Mr. Rutherford carried off the sweepstakes for best wether, of any age or breed ; also four first prizes, four second, and one third prize.

Geo. Hood, Esq., of Guelph, had thirty-one head on the ground, twelve of which were entered for competition.

His Oxford Down grades would be hard to beat for style, quality, and apparent contution.

He was the winner of nine prizes ; four first, four second, and one third, and carried away the sweepstakes for best ewe of any age or breed.

J. Dryden, M.P.P., showed two thorough-bred Shropshires.

J. Kelly, Perth, exhibits three pure Leicesters, and four grades. Mr. Kelly took three first prizes, and one second.

Mr. J. G. Rudd was also an exhibitor. He showed six sheep. In the long-woolled class two, and in the middle-woolled class four.

Mr. Hood's sweepstakes ewe was slaughtered on the ground, and a more prime carcass of mutton is rarely found in any country.

Hogs.

Little competition, but fine what there was. The following are the exhibitors :— Robert Dorsey and Son ; Wm. Harris ; J. Sisley ; J. Featherstone ; and George Savage.

The sweepstakes in this case was carried off by Robert Dorsey and Son, Summerville.

Poultry.

The live poultry exhibit was small, but very good. R. Dorsey and Son, of Summerville, Mrs. Thos. Card, of Marden, and Joseph Tomalin, of Brampton, were the principal exhibitors in this line. Mr. Tomalin showed a fine collection of every variety of barnyard fowls; he was also an exhibitor of dressed poultry; and carried away the principal prizes in both classes.

Closing Scenes.

During Saturday afternoon and evening, a large number of farmers and city butchers were to be seen travelling along the stalls in groups of twos and and threes, discussing the merits of the various animals. On those which stood underneath the red ribbons, the criticisms were keenest.

The most noticeable of these were "White Duke," "Champion" and "Maid of Honour."

Some of the city butchers purchased from the exhibitors a number of their best animals, for some of which extraordinary prices were paid. The highest was 14½ cents per pound, given by Mr. Frankland for "White Duke," which was in all probability the best finished steer on the ground. Mr. Frankland also bought H. and. I. Groff's sweepstakes cow, "Maid of Honour," J. and R. McQueen's bull, "Duke of Athol," an animal of great length of frame and depth of fore-quarters, and weighing 2,470 pounds. Mr. Mallon bought twenty head, the principal of which were H. and I. Groff's "Champion" and "Jim;" and Wm. Downing's "Simon" and "Romeo."

As evening drew on the crowd gradually became smaller, until at seven o'clock there were not more than threescore left. After this hour the throng in the building was at no time large, but they were continually circulating, which was better for the treasury than a stationary one.

The light to-night was also a comparative failure, which was very annoying for visitors wishing to see the stock. It was on account of some deficiency in the belting that this failure was due, and not to any mismanagement on the part of the promoters of the show.

At ten o'clock the show was closed, having proved itself a success, even beyond the expectations of its most hopeful promoters.

One noticeable feature of the show was the absence of all but Shorthorn blood in the ring. The value of the shorthorn bull for crossing upon the Canadian cow, is every year becoming more and more appreciated. It speaks much for their populariay that they should be allowed to carry, without opposition, all the prizes from a show like this one. The steers got by this cross are noted for their great depth and thickness of carcass, are rapid growers, mature early, and have good constitutions. Shorthorns attain a ripeness at two, three or four years, that we find in no other breed. They have a fine style and carriage, the choice flesh is put on in parts where ordinary cattle fail; and it is very doubtful if there is a superior class of beefing cattle in the world. The Hereford and Aberdeen Angus Poll are said to be the Shorthorn's most dangerous rivals.

I think that all that Toronto requires now to make a show of this kind an annual occurrence in the future, is suitable buildings for the purpose, having a slaughtering house in connection with them. When they build these, I am sure the show will not lack for interest; we will find all the principal beefing breeds there represented, and it will stimulate the growth of a superior class of cattle, until our fair Province will be second to none on the globe.

John B. McKay,

Guelph, O. A. C.

VETERINARY REPORT.

To H. Wade, Esq.,

Secretary Agriculture and Arts Association:—

Sir,—I beg leave to report that the Sessions of Ontario Veterinary College for 1882-3 commenced October 25th and ended March 29th. There was an increase in the number of students over any previous Session. It is with pleasure I can state that the students generally are most attentive and persevering in their studies.

The Christmas examinations took place on December 21st, 1882, when the following gentlemen graduated, viz. :—

George F. Fesling, Indianopolis, U.S.
John N. Perdue, Wingham, Ont.
W. F. Kidd, Cookstown, Ont.
Fred. Fisher, Baillieboro, Ont.
Ward Woodhull, Angola, Ind., U.S.
J. G. Reed, Ruschylvania, Ohio, U.S.
H. H. Clements, Coldwater, Mich., U.S.
A. W. Stone, Detroit, Mich., U.S.
W. G. Marshall, Dungannon, Ireland.

Messrs. Clement, Perdue and Stone were credited with honours.

The Spring Examinations were concluded March 29th, 1883, and below are the successful graduates.

Henry B. Adair, Paris, Ky. U. S.
Jas. Addison, Newmarket, Ont.
Frank H. Armstrong, Ansable, Mich., U. S.
Vinton A. Berry, Marion, Ohio, U. S.
James E. Blackell, Birr, Ont.
Cyrus J. Blank, Coopersburg, Penn. U. S.
Elmer. E. Bowen, Tyre, N. Y., U. S.
Robert W. Carter, Guelph, Ont.
Ed. St. George Courtenay, Waterford, Ireland.
John B. Crane, Sharon Centre, Ohio.
Samuel S. Dickinson, Sharon Centre, Ohio.
Chas. M. Dunn, Hamilton, Ont.
Edward R. Forbes, Toronto, Ont.
Jas. W. Fisher, Baillieboro', Ont.
Wm. R. Hone, Cleveland, Ohio, U. S.
V. L. James, Springfield, N. Y., U. S.
Henry F. James, Ottawa, Ont.
George P. Jeffray, Toronto, Ont.
James Johnston, Dundee, Scotland.
Robert A. Jones, Simcoe, Ont.
Wm. Jopling, Parkhill, Ont.
Jesse R. Keeler, Harleyville, Penn. U. S.
Thos. Kerr, Wingham, Ont.
Chas. C. McLean, Meadville, Ont.
George Murray, Ridgetown, Ont.
John Newton, Weston, Ont.
John Perdue, Orangeville, Ont.
Mortimer W. Plank, Uxbridge, Ont.
Marshall M. Poucher, Oswego, N. Y., U. S.
Tipton J. Queen, Salineville, Ohio, U. S.
John F. Quinn, Edmonton, Ont.
Wm. R. Rowe, Rondeau, Ont.
Jas. W. Sallade, Reading, Penn. U. S.
Allan S. Shimer, Thomasville, Penn. U. S.
Merrit W. Line, Sterling, Ont.
Jas. F. Smith, Port Ryerse, Ont.
Jacob Stallman, Rochester, N. Y., U. S.
John G. Stewart, Brantford, Ont.
Robt. W. Stewart, Mt. Victory, Ohio, U. S.
Geo. W. Thompson, Markmam City, Mich., U. S.
Albert E. Thompson, Strathroy, Ont.
Joseph B. Thompson, New York, U. S.
Henry Vanzant, Mongolia, Ont.
J. C. Whitney, Allen, Mich., U. S.
Willard E. Wight, Millbury, Ohio, U. S.
J. H. Schoonmaher, Kyresike, N. Y., U. S.

Prize and Honour List (Senior Students).

Pathology.—First prize, silver medal, C. C. McLean; second prize, H. F. James; third prize, H. B. Adair.

Honours.—Blank, Blackall, Carter, Dunn, V. L. James, Jopling, Newton, Plank, Sallade, Line, Stimpson, Smith, A. Thompson, Vanzant.

Anatomy.—First prize, silver medal, H. F. James; second prize, C. C. McLean; third prize, H. B. Adair, J. Newton, equal.

Honours.—Dunn, V. L. James, Jeffray, Jones, Jopling, Kerr, Plank, Sallade, A. Thompson, Wight.

Entoza.—Prize, J. Newton.

Honours.—Carter, Dunn, H. F. James, Jopling, Blank, Sallade, Stimpson, A. Thompson.

Microscopy.—Prize, Dunn.

Honours.—Dickinson, V. L. James, Queen.

Chemistry.—First prize, Jopling; second prize, Newton; third prize, Dickinson.

Honours.—Armstrong, Adair, Bowen, Dunn, McLean, Sallade, Stimpson, A. Thompson, Wight.

Physiology.—First prize, H. F. James; second prize, Sallade; third prize, Dunn.

Honours.—Adair, Blackall, Blank, Courtenay, Fisher, Jopling, McLean, Newton, Plank, Line, A. Thompson, Wight.

Anatomical Preparation.—First prize, silver medal, H. B. Adair; second prize, V. L. James.

Materia Medica.—First prize, H. F. James; second prize, Sallade; third prize, Line.

Honours.—Adair, Dunn, Dickinson, V. L. James, McLean, Newton, Smith.

Breeding and Management of Stock.—First prize, Jopling, second prize, H. F. James; third prize, Adair.

Best General Examination.—Gold medal, H. F. James.

Honours.—Adair, V. L. James, Jopling, McLean, Sallade.

Prize and Honour List for Junior Students.

Anatomy.—First prize, silver medal, L. C. Tiffany, Bloomington, Ill. U. S.; second prize, J. F. Reid, Belleville, Ont.; third prize, G. W. Butler, Sterling, Ont.

Honurs.—J. S. Blank, Penn., U. S.; Ed. Courtenay, Ky., U. S.; H. G. Reed, Georgetown; A. Harthill, Ky.; J. Sutcliffe, Brooklyn, N. Y.; F. Hewitt, York; J. T. Ormsby, Ancaster; E. A. Steenburg, John Wilson, James Wilson, H. Walstom.

Pathology.—First prize, J. F. Reed; second prize, L. C. Tiffany; third prize, G. W. Butler.

Honours.—Blank, Courtenay, Cruikshank, Eisenmaro, Graham, Harthill, Hewitt, Kincaid, Livingstone, McArthur, Mason, Ormsby, Parker, H. G. Reed, Stork, Steenburg, Sutcliffe, Tenant, Waldron, Jas. Wilson, John Wilson.

Chemistry.—First prize, Silverthorne; second prize, R. Ardeil.

Physiology.—First prize, H. G. Reed; second prize, J. H. Reid; third prize, W. F. Berry.

Honours.—Butler, Kincaid, McArthur, Tiffany, James Wilson, John Wilson, H. Waldron.

(Signed) A. Smith, V.S., *President.*

REPORT

OF THE

COMMISSIONER OF PUBLIC WORKS

FOR THE

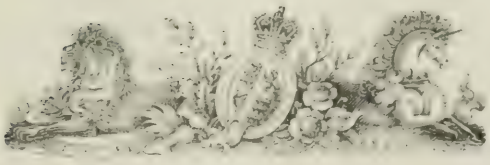
PROVINCE OF ONTARIO

FOR THE

YEAR ENDING 31ST DECEMBER,

1883.

Printed by Order of the Legislative Assembly.



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1884.

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REPORT

OF THE

COMMISSIONER OF PUBLIC WORKS

FOR THE

PROVINCE OF ONTARIO,

FOR THE YEAR ENDING 31ST DECEMBER, 1883.

To His Honour the Honourable JOHN BEVERLEY ROBINSON,

Lieutenant-Governor of the Province of Ontario, etc.

I respectfully submit the usual annual report of the operations of the Department of Public Works for the year ending the 31st of December, 1883.

The several works in connection with the expenditure on capital account, and repairs to the Public Buildings and Institutions of the Province, are explained in the report of the Architect, etc., of the Department, a copy of which is hereto attached.

The report of the Engineer contains the details of the works connected with the construction and maintenance of locks, dams, slides, etc., the applications for aid by Municipalities, for drainage purposes, and the extension of Railways during the year.

Very respectfully submitted,

C. F. FRASER,

Commissioner, etc.

DEPARTMENT OF PUBLIC WORKS, ONTARIO.

December 31st, 1883.

REPORT

OF

THE ARCHITECT, ETC.

Department of Public Works, Ontario,

Toronto, December 31st, 1883.

Sir,—I have the honour to submit the following report :—

GOVERNMENT HOUSE.

The ordinary repairs required for the residence and outbuildings were attended to during the year.

Several rooms on the second and third storeys were painted and papered as directed.

Additional furniture and furnishings were provided on the principal floor.

The grounds as usual were kept in good order.

A fire occurred in a dressing-room on the second storey, on the 6th of November, owing to the window curtains having been ignited by a gas jet. The damage was $72.00, which was paid by the Insurance Companies. The walls were repapered and the woodwork repainted.

PARLIAMENT AND DEPARTMENTAL BUILDINGS.

The ceiling of the Legislative Chamber and Library were repaired, and the walls of the former repapered.

The ordinary repairs to the building, furniture and furnishings were attended to as required, and the grounds have been kept in good order.

ASYLUM FOR THE INSANE, TORONTO.

The only expenditure required in connection with this institution, was for the renewal of a hotwater boiler, and for some tinsmith's work for the temporary cottage for females.

ASYLUM FOR THE INSANE, LONDON.

Tenders were received for the construction of a brick coal shed in the rear of the refractory building, and for an additional building for religious services in the rear of the main building ; the lowest being those of Mr. J. Purdom, London, which were accepted.

The former building was completed in time to receive the annual supply of coals for the refractory building, and the latter will soon be completed ; some internal finishings being still required.

Sundry repairs were made to the eavetroughs and drains round the main building, under the supervision of the Permanent Clerk of Works.

Some damage was done to the mouth of the main sewer where it enters the creek, south-east of the Asylum Grounds, owing to a severe rain storm during the summer. The damage was repaired, and the bed of the creek cleared out, so as to allow an unobstructed passage for the sewage through the creek.

ASYLUM FOR THE INSANE, HAMILTON.

The plans and specifications for a cottage for acute cases, for enlarging the west chimney, and for the new laundry, were prepared in the early part of the year, and submitted for tenders. After due advertisement, the tender of Messrs. J. & E. Dickenson, of North Glanford, being the lowest, was accepted.

The walls of the cottage have been constructed and roofed, the building having been fully enclosed so as to proceed with the internal wood work during the winter. The chimney and laundry have been completed.

Tenders were received for the iron frames and sashes for the windows, and that of Messrs. Olmstead & Son, Hamilton, was accepted.

The roofs, down-pipes and drains were repaired where required, and double sashes were provided for the Medical Superintendent's residence, and for the windows on the most exposed portions of the buildings.

ASYLUM FOR THE INSANE, KINGSTON.

The works connected with the construction of the cottage for chronic patients were continued during the summer, and when the steam-heating apparatus has been completed, the cottage can be occupied.

The gasworks on the "Lowe" process have been completed, and the several buildings are now supplied with gas made from crude petroleum.

Tenders were received for the construction of the new steam boilers and heating apparatus for the cottage for chronic cases, and the lowest being that of Messrs. McKelvey and Birch, Kingston, was accepted.

The steam-heating apparatus, and the other works in connection with the cottage, will be completed next month.

ASYLUM FOR IDIOTS, ORILLIA.

A duplicate steam pump was supplied to the engine house of this institution, and the cost of the pumps, including fittings, has been the only expenditure.

REFORMATORY FOR BOYS, PENETANGUISHENE.

The expenditure on account of this institution has been small. The construction of the stable, etc., having been postponed until next year, as the Inspector of Prisons, etc., intends removing the farm buildings from the bay-shore to the rear of the Reformatory buildings, a larger appropriation will require to be provided for that purpose this year.

ANDREW MERCER REFORMATORY FOR FEMALES, TORONTO.

Some repairs were required to the roofs and drains, which were attended to; and all the works connected with this institution are in good order and condition.

CENTRAL PRISON, TORONTO.

There has been no expenditure on account of the appropriation for this institution during this year.

A fire occurred in the north workshop of this Prison on the 20th of November, which destroyed the woodwork of the upper floor, also the roof, door, and window frames, sashes, etc., the brickwork of the walls having been partially injured.

Detailed measurements and estimates of the damage were forwarded to the Inspector of Insurance, and the loss is now in process of adjustment with the Insurance Companies.

DEAF AND DUMB INSTITUTION, BELLEVILLE.

Plans and specifications for the construction of a filtering tank at the engine house on the bay shore, for the enlargement of the pumping engine house, the extension of the water supply pipe to deep water, the sinking of a new well, and the diversion of the sewage from the west to the east drain, were prepared in the early part of the season, and submitted for tenders. The tender of Mr. T. McCabe, Trenton, being the lowest, was accepted. The works are not yet completed, but it is expected that the filtering tank will be finished next month; the sinking of the same in the rock below the surface of the water being of an unusual character.

A sufficient quantity of pure water for drinking purposes, was procured from the well sunk on the east side of the grounds, the rock having been bored to a depth of thirty feet, and forty-two feet from the surface of the ground.

The usual water supply for domestic purposes, was pumped from the bay to the tanks in the roof of the centre building, and from thence distributed to the several cisterns in the kitchen, dormitory, water closets, etc.

A new Northey steam pump has been supplied to the engine house at the bay, and will be used when the filtering tank has been completed, and the connections made with the supply pipes.

The outside woodwork of the chapel, kitchen, servants' apartments, farm buildings, gymnasium, water closets, and gatehouse was painted, and sundry other repairs were made during the year.

BLIND INSTITUTION, BRANTFORD.

Two additions for outside water closets were constructed on the east and west sides, and in connection with the main building.

An additional tank for increased water supply was placed near the pumping engine house, and connected with the old tank and spring.

Tenders were received for the above work, after due advertisement; and the tender of Mr. W. Watt, Brantford, being the lowest, was accepted.

The work was completed shortly after the vacation, and is now in a satisfactory condition.

The hot water apparatus in the Principal's residence was repaired, and a new Spence section boiler placed in the cellar; the former hot water boiler having been found insufficient for the purpose in very severe weather.

Steam-heating pipes were extended from the boiler house to the workshop, and large radiators placed on both floors in the latter building, for the amount provided in the appropriation.

The above work has been fully tested, and has been found quite satisfactory.

AGRICULTURAL COLLEGE, GUELPH.

Tenders were received for the construction of a propagating house and lecture room in accordance with the plans, specifications and estimates of Messrs. Miller & Yates, Philadelphia, U. S.; but the amount of the appropriation being insufficient, the erection of the building was postponed until next year.

The cooking range and steam kettles were supplied, and repairs to drains, etc., where required, were attended to during the year.

EDUCATIONAL DEPARTMENT AND NORMAL SCHOOL, TORONTO.

A hardwood floor was laid in the front building, and the usual repairs to the steam boilers and heating pipes, drains, etc., were made when required during the year

Some painting and whitening in the school and classrooms were done as required.

NORMAL SCHOOL, OTTAWA.

Sundry repairs to the buildings, and steam heating boiler furnaces were made during the year as required.

The plank walks in front of the grounds were renewed, and the front fences were repaired and painted.

SCHOOL OF PRACTICAL SCIENCE, TORONTO.

The attic of the west wing was fitted up as an additional classroom for the Professor of Biology, and the roof was repaired where required.

Three additional coal stoves were provided as auxiliaries to the hot air furnaces, the latter being insufficient for severe weather.

OSGOODE HALL, TORONTO.

Plans and specifications were prepared in the early part of the year for the proposed additional offices in the west wing, which were required to be more extensive than what was originally intended, owing to the increased demand for accommodation for the administration of justice, a new court for the Chancery division and Judges' apartments being necessary in addition to the Master's and Accountant's offices.

Tenders were received after due advertisement, the lowest being that of Mr. John Herbert, Toronto. The work has progressed in a satisfactory manner, the walls having been built and the building roofed in before the winter.

Tenders also were received for the reconstruction of the steam-heating apparatus, which has been constantly in use for more than twenty years, and the tender of Messrs. Bennett & Wright, of Toronto, being the lowest, was accepted.

The main steam and return pipes were placed in the building before the heating apparatus was required, and the new steam radiators will be connected with the mains and returns during the vacation next summer.

The Library and Judges' apartments in the Court of Appeal division were papered and painted.

Changes have been made in the Master's offices on the ground floor of the Court of Appeal division, to meet necessary requirements ; and partitions were constructed in the housekeeper's apartments, to afford the further accommodation needed.

The usual repairs to the roofs and other portions of the buildings were attended to as required, and the necessary articles of furniture and furnishings were supplied as approved.

ALGOMA DISTRICT.

The fences round the gaolyard at Sault Ste. Marie were repaired, the expenditure having been trifling.

Repairs were not required for the lock-ups at Manitowaning, Little Current, or Gore Bay.

THUNDER BAY DISTRICT.

Some slight repairs were made to the gaoler's residence at Port Arthur.

MUSKOKA DISTRICT.

When settlement was made with the Insurance Companies, tenders were received for the reconstruction of the courtroom and lock-up, Huntsville, which had been burned last year; and the tender of Messrs. Proudfoot and Francis, Huntsville, being the lowest, was accepted.

The work has progressed under the superintendence of the Permanent Clerk of Works, but is not yet completed.

The building has been roofed in and enclosed, the remaining portions of the work will be completed next month. Some slight repairs were made to the Registry office, at Bracebridge, including new locks, etc.

PARRY SOUND DISTRICT.

There has been no expenditure on account of buildings in this district this year.

NIPISSING DISTRICT.

Some grading and levelling was required round the lock-up at Mattawa, the expenditure on account of the same having been trifling.

NEW TERRITORY.

There has been no expenditure on account of the appropriation for the lock-ups and houses at Moose Fort.

UNORGANIZED TERRITORY.

The courtroom and lock-up at Rat Portage were completed on the opening of navigation as expected ; the work, as previously reported, having been done under the superintendence of Mr. H. Munro, Clerk of Works.

The expenditure on account of this building has been greater than was anticipated, owing to the difficulty and increased expense of procuring workmen and materials in that remote locality.

The building has been occupied for some time, and has been found suitable for the purpose.

MISCELLANEOUS.

Niagara River—Fence Along the Bank.

The work in connection with the iron pipe fence along the bank of the Niagara River, was continued during the summer and completed. The plank walk alongside the fence will be constructed by the town of Niagara Falls early next year.

Agricultural Hall.

The painting of the brickwork on the fronts, on Yonge and Queen Streets, was completed early in the season. Sundry repairs to the boiler, furnaces and drains were attended to during the year as required.

Brock's Monument.

The mason and cut stone work of the monument, where required, were repaired, and a new flag and flag staff were provided and placed near the monument.

I have the honour to remain,

Your obedient servant,

KIVAS TULLY,

Architect, etc.

Hon. C. F. FRASER,

Commissioner of Public Works,

Ontario.

REPORT

OF

THE ENGINEER

OF

PUBLIC WORKS.

Department of Public Works, Ontario,

Toronto, 31st December, 1883.

Hon. C. F. Fraser, *Commissioner of Public Works, Ontario.*

Sir,—I have the honour to submit the following Report on the construction and maintenance of Public Works, also the extension of railways and drainage works throughout the Province, during the year ending this 31st day of December, A.D. 1883.

GULL AND BURNT RIVER WORKS.

The improvents and repairs which have been made to these works are as follows :—

Hall's Lake Rapids.

Three glance piers have been constructed in the rapids below the dam, at the outlet of Hall's Lake to facilitate the running of saw logs and timber. The piers are six feet in width and five feet in height, one of them being fifty and the other two sixty feet in length each.

Elliott's Falls.

In order that the public might be more satisfactorily served, the slide opening of this dam has been removed from the west to the east side of the river. A slide ninety feet in length and twenty-five feet in width, and a wing dam eighty feet in length, ten feet in width and eight feet in height have also been constructed at the falls, in the easterly channel of the river below the dam.

These works will greatly facilitate the public user of these waters, and I am satisfied that the serious inconvenience which was annually experienced at this locality, will now be done away with.

Hawk Lake—Dam and Slide.

This dam has been supplied with two new stop-logs, and the floor planking of the slide has been repaired.

A glance pier seventy feet in length, twelve feet in width, and five feet in height has also been constructed to facilitate the passage down the rapids, immediately below the dam.

Norland Slide.

Owing to the formation of a jam of saw logs, about sixty feet of the lower end of this

slide was carried away in the month of June last. This damage has since been made good, consequently the slide is again in a fair state of repair.

Crab Lake—Dam and Slide.

Considerable injury was done to this slide during the past season by saw logs, and the floating apron, seventy feet in length, which was secured to the lower end of it, was carried away. The necessary repairs required in consequence of this damage have been attended to, and the structure is now, therefore, again complete and ready for use.

The floor planking of the slide of Keneses Lake dam has been repaired, and the dam on Devil's Creek gravelled, to make it water-tight.

LAKE NIPISSING DREDGING.

Owing to the existence of shoals, situated at short distances from the mouths of the South and Sturgeon Rivers, navigation on this lake has in the past been seriously interfered with annually during the seasons of low water; and in order that the public might be better served, an appropriation of $6,000 was granted last Session to be expended in making such improvements as were necessary.

Operations were commenced in the early part of the present year, and a dredge forty-nine feet in length, twenty feet in width, and five and a-half feet in depth, and two scows forty-five feet in length, twelve feet in width, and four and a-half feet in depth each constructed. The necessary machinery was obtained from the dredge on Muskoka Lake, and conveyed by team from Rosseau to Nipissing, a distance of about sixty-eight miles.

The dredging was commenced in the early part of August, and the work proceeded with continuously until the latter part of October, when a channel 1,200 feet in length, ninety-five feet in width and an average depth of two and a-half feet had been excavated through the bar which obstructed the entrance to the South River. In extreme low water this channel will have a depth of from seven to seven and a-half feet, which will enable the steamer to enter the river without difficulty during the entire seasons of navigation.

The water of Lake Nipissing lowered two feet eight and a-half inches from the 4th of August last to the 31st of October; and had it not been for the dredging already done the steamer would have been unable to enter the river after the early part of September. This would have seriously affected the lumbering and settlers, interests in that locality, as the greater portion of the supplies are brought in by the Canadian Pacific Railway to North Bay, thence by boat to South River and the village of Nipissing.

The bar through which the cut requires to be excavated at the mouth of the Sturgeon River is situated a considerable distance out in the lake; and as the weather had become very cold and stormy when the cut at South River was completed, it was not deemed advisable, owing to the exposed position of the work, to commence at the Sturgeon so late in the season; consequently operations were suspended, and the dredge and scows taken up the South River and laid up for the winter.

A revote of the unexpended balance will therefore require to be taken to enable the work to be completed in 1884; and, in addition, provision should also be made in the coming year's estimates for the removal of several points which interfere with navigation on the South River.

SCUGOG RIVER DREDGING.

As stated in my previous report, this work was well advanced at the close of 1882. Operations were again resumed on the 18th of May last, and the work proceeded with continuously until the 28th of June, when the improvement was completed.

STONY CREEK DREDGING.

Frequent complaint having been made to the Department of lands being annually flooded owing to the formation of an obstruction across Stony Creek, on Lot No. 5, in the Vth Concession of the township of Ops, an examination was made when it was ascer-

tained that the dam at Lindsay affected this creek for a considerable distance up stream, causing still water where there originally was a good current.

In consequence of this a bar had formed across the creek which prevented the flood-water from passing away as rapidly as it had formerly done, thereby affecting the low lying lands in the vicinity.

Operations to remedy this grievance were commenced in October and a channel excavated through the bar 694 feet in length, twenty-five feet in width, and five feet in depth, which gives a water-way about equal in area to the creek above.

I might state that since the completion of the work I have received a communication from the township Clerk of which the following is an extract: "The people who petitioned for this are more than satisfied, they are in fact delighted to see large tracts of land exposed which had previously, for several years, been submerged. On behalf of the Municipal Council of Ops and of myself, I have to say that the manner in which the work has been done is very satisfactory, and realizes our most sanguine expectations."

OTONABEE RIVER WORKS.

In the estimates for 1882 provision was made for the reconstruction of the dam across the Otonabee River, at Young's Point, but as explained in my previous report the work was not proceeded with, owing to the Department being unable to purchase the necessary timber at what was considered reasonable rates.

As early as the month of May last all necessary arrangements had been made to proceed with this work, but the Department was then informed that the Dominion Government had assumed control and intended constructing a new dam in connection with the Trent Valley Canal. Upon enquiry being made of the Hon. the Minister of Railways and Canals an official communication was received stating that such was the intention.

As this work will not now require to be carried out by the Province, the unexpended balance of the appropriation may be allowed to lapse.

MAINTENANCE OF LOCKS, DAMS AND SWING BRIDGES.

The improvements and repairs which have been made out of this appropriation during the present year are as follows:—

Lock at Port Carling.

The repairs to this lock were commenced after the close of navigation in 1882, but owing to the insufficiency of the appropriation, work had to be suspended before the close of the year. Operations were, however, resumed in the early part of 1883 which enabled the repairs to be about completed upon the opening of navigation. The lock has been entirely rebuilt from low water up, the clay puddle-walls behind the quoin posts were removed and replaced with portland cement concrete, the sides of the chamber sheeted with three-inch planking and the retaining walls, both above and below, repaired. Platforms have also been constructed along the top of the lock walls, and new foot paths with iron guard-rails have been put on the gates for the safety of persons crossing or working the lock.

A storehouse for tools, etc., with an office in same for the lockmaster has also been erected, and two posts and lamps provided for the safety of the public, and to facilitate the working of the lock at night.

Cut at Port Sandfield.

A post and lamp has been placed on the cribbing at each end of this cut, so as to indicate its position to persons on the steamers which frequently have occasion to pass through at night, and also to enable the public to land from them with safety.

Dams at Bala.

Repairs have been made to the stoplog, platforms, and posts of the slide, and wedge pieces have been spiked on the sides of the opening in order to prevent the lower post-from being injured by saw-logs.

Fairy Lake Dam.

This dam has been supplied with several new windlasses, a new stop-log post, and new stoplogs for the slide opening.

Lock at Young's Point.

Repairs have been made to the valves of this lock, and the swing-bridge adjusted.

Lindsay Lock.

Repairs have been made to this lock, and a new boom has been provided and placed in the river above in order to protect the dam. A new fence enclosing the ground on the east side of the storehouse has also been erected.

Balsam River Lock.

The gates of this lock have been repaired, and the dam has been gravelled to make it water-tight. Two new stoplogs have also been provided for the slide opening.

The diving apparatus, which was purchased in April last, has been frequently used, and has already been of great service to the Department in making repairs to the works during the present year.

The following are the lockmaster's returns of the lockages made at the different locks during 1883.

Balsam River Lock—Steamboats, 18 ; small boats, 23 ; cribs of timber, 26 ; sawlogs and pieces of square timber, 194,940.

Lindsay Lock—Steamboats, 299 ; scows, 238 ; cribs of timber, 153.

Mary's and Fairy Lakes Lock—Steamboats, 262 ; small boats, 23 ; scows, 10 ; cribs of timber, 2.

Young's Point Lock—Steamboats, 437 ; scows, 191 ; cribs of timber, 184.

Port Carling Lock—Steamers, 1,159 ; small boats, 353 ; scows, 122 ; rafts, 75 ; and 400,675 sawlogs passed over the dam.

UNFORESEEN AND UNPROVIDED FOR.

When the Province of Ontario assumed control of the works at Lindsay, the Government received possession of certain land adjacent to the lock, as belonging to the Board of Works of the late Province of Canada. During the present year however, Mrs. Caroline Laing filled a petition of right, claiming to be entitled thereto, and obtained a decree for the possession thereof, and $50.00 costs. Upon her application to file a petition, her title was not complete, but before the sitting of the court she procured such conveyances as gave her clearly a right to recover the land, so that it was not deemed advisable to defend at the trial and thus increase the costs.

The property was afterwards sold by public auction, and as the departmental storehouse and office was erected on a portion of it, a lot twenty-five feet in width was bought at $21.00 per foot frontage. The total amount expended in connection with this matter amounts to $641.90.

NATION RIVER WORKS.

An appropriation of $7,000.00 was granted last session to aid in dredging and deepning the bed of the Petite Nation River. Not only during the usual spring and fall freshets, but on any occasion of protracted or heavy rain-fall during the summer season, the waters of this river back-up and overflow, and submerge large tracts of low-lying but fertile land, causing serious loss annually to the residents of the locality.

The section of country most effected is situated up the stream from Chesterville, where the river for a distance of over fourteen miles is frequently obstructed with shoals composed of clay, gravel, and bouldera

From Chesterville to Moose Creek the river banks are high, consequently the adjacent lands are not seriously effected by the freshets ; but further down the stream an obstruction known as the "Pitch Off," situated about one and a-half miles from the village of

Plantagenet, causes the water to back-up and overflow over large tracts of low-lying lands as far up the stream as the last mentioned point. This obstruction consists of a flat ledge of limestone rock, which extends for a distance of about three hundred feet up the stream, forming a natural dam.

The work has not as yet been proceeded with above Chesterville, but a considerable amount of blasting has been done by the Department at the "Pitch Off." Operations were commenced in the latter part of September and continued until the 15th November, when about one-third of the proposed channel had been excavated; the water however, then became so high that the work could not be advantageously carried on longer, consequently the coffer dam was taken out of the river, the tools stored away, and the operations for the time being ceased.

A revote will therefore require to be taken so as to enable operations to be continued in 1884.

PORTAGE DU FORT BRIDGE.

A revote of the appropriation of $250, which was granted in 1881 to meet one-fourth the cost of repairs to bridge across the Ottawa River at the village of Portage du Fort was again taken last Session.

The amount was granted on condition that one-half of such cost be provided by the Dominion of Canada, and the remaining one-fourth by the Province of Quebec, and that the Province of Ontario should not in any event be called upon to pay for such repairs more than the above mentioned amount.

The repairs were completed during the present year and the necessary certified vouchers of the expenditure having been sent to the Department, were examined and a cheque for the amount of the appropriation sent to the Secretary of the municipality of the village of Portage du Fort.

LOCK, ETC., AT MAGANETEWAN.

The necessary working plans having been prepared, tenders were invited by advertisement in September last, for the construction of the lock, channels and wing-dams proposed to be constructed at this village, and that of Mr. M. Starrs, of Ottawa, being the lowest was accepted.

Since the contract was awarded the contractor has been busily engaged in getting in the necessary plant, etc., and arranging for the supply of the timber required for the work.

The excavation for the lock pit and channels will consist almost entirely of rock, and it is intended that this work shall be proceeded with continuously during the present winter, operations having been already commenced, and that it will be pushed vigorously to completion.

DRAINAGE WORKS.

Applications have been received and aid granted to the following townships, under the "Ontario Municipal Drainage Aid Act," during the present year:—Richmond, Ops, Thurlow, Moore, Dunwich, Brooke, Turnberry, Melancthon, Amaranth, Ekfrid, Proton, Howard, Colchester, Kinloss, Grey, and Aldborough.

EXTENSION OF RAILWAYS IN 1883.

The extension of railways throughout the Province has been steadily proceeded with during the present year. The details of the works on the several lines as far as could be ascertained are as follows:—

Erie and Huron Railway.

The construction of this railway was commenced in the early part of 1879, and during that year a considerable amount of grading was done, and a number of bridges, culverts and cattle-guards constructed.

Operations were then suspended until the early part of the present year, when construction work was again commenced, and so vigorously pushed that the entire line from

Rondeau harbour to Wallaceburg, a distance of $39\frac{7}{100}$ miles, was completed and opened for traffic in the latter part of September last. I understand that the Company intend to extend the line from Wallaceburg to Sarnia, but operations upon this portion have not yet been commenced.

Ontario and Quebec Railway.

The construction of this railway has been steadily proceeded with during the present year. I am informed that the line is all graded from its junction with the Credit Valley Railway, at Carlton to Perth, the necessary masonry, such as culverts, bridge piers, abutments, etc., all completed and about 175 miles of track laid, and seventy-five miles ballasted. The bridges on the line are, I understand, to be of iron and steel, several of the principal structures having already been erected. The station buildings are now being constructed and it is expected the railway will be opened for passenger traffic from Toronto to Perth, about the latter part of June next.

Kingston and Pembroke Railway.

At the close of 1882 this railway was reported as completed to Clyde Lake, being a distance of $80\frac{32}{100}$ miles northerly from Kingston. Construction work has since been steadily proceeded with, and I am informed that fourteen miles have been graded, seven miles of iron laid, and seven miles ballasted during the present year, and that it is expected the line will be completed to Renfrew about the 31st of December, 1884.

Napanee, Tamworth and Quebec Railway.

Construction work was commenced upon this railway during the month of July, 1881, and proceeded with until the latter part of that year, when operations for the time being ceased. It was then reported that the grading was completed, and the necessary bridges, culverts, cattle-guards, etc., nearly all constructed. Operations were again resumed on the 12th of September, 1883, and since then I am informed that four bridges of twenty feet span each, and one of 100 feet span, have been constructed, twenty-five miles of iron laid, and ten miles ballasted, and an engine house erected at Napanee. The station buildings are now under construction and it is expected that the line will be completed from Napanee to Tamworth about the 1st of June next.

Canada Atlantic Railway.

The extension of this railway from the Elgin Street station, at Ottawa, to the Chaudiere Falls, has been steadily proceeded with during the present year, and I am informed that the line is now completed and opened for traffic to Broad Street, and that branch lines are still being constructed to serve the several lumber mills and other manufacturing establishments in the vicinity of the falls. The distance from Elgin to Broad Street, I understand, is $2\frac{35}{100}$ miles, and in addition to this 5,310 feet of new sidings have been laid during the present year.

Toronto and Ottawa Railway.

The construction of this railway was commenced in 1881, and, as stated in my previous report, it now forms a portion of the system known as the Midland Railway of Canada.

The link connecting Wick and Manilla, about six and a-half miles in length, was completed and opened for traffic on the 4th of July, and the Peterborough and Omemee link, and a link about one and a-half miles in length at Lindsay, were completed on the 26th of November last. A portion of the line, extending fron Madoc to Bridgewater, a distance of about nine miles, was completed and opened for traffic about twelve months ago, but since that time construction work has not been proceeded with east of Peterborough.

Ontario Central Railway.

During the present year construction work has been vigorously pushed on this railway, and I am informed that the grading of the entire line, seventy-two miles in length,

is nearly completed, the track laid fifty-eight miles northerly from the Grand Trunk Railway crossing at Trenton, and the road well ballasted for a distance of twenty miles. It is expected the entire line will be completed and opened for traffic about the 1st of May next.

I understand the company are constructing an elevated dock at "Weller's Bay," for the shipment of iron ore, etc. The dock is to be 1,512 in length, twenty-eight feet in width, and thirty-five feet in height (above water level) and will be provided with 115 pockets, each capable of containing 125 tons of ore.

The superstructure will be built on piles, with cribwork thirteen feet in width forming the front of the dock. The cribwork, I understand, is nearly completed and the erection of the superstructure is to be proceeded with at once. The development of the iron mines, which are situated at different points along this line of railway, has been steadily proceeded with during the present year, and I am informed that about 30,000 tons of No. 1 ore is now stacked at one of them awaiting the completion of the line for shipment.

CANADA CENTRAL RAILWAY.

At the close of 1882, this railway, which now forms a portion of the Canadian Pacific, was reported as opened for traffic to Mattawa, beyond which point the work was sufficiently advanced to admit of construction trains being run to Callendar station. This latter portion of the line, about 40 miles in length, has since been completed, and opened for traffic.

MILEAGE OF RAILWAYS.

The following revised statement, to the close of 1883, gives in detail, the mileage on each railway in Ontario, distinguishing between those constructed prior to and after Confederation, but exclusive of the portion of the Canadian Pacific, west of South-East Bay, Lake Nipissing:—

No.	NAME OF RAILWAY.	TERMINAL POINTS.		Completed prior to Confederation, July, 1867.	Completed since Confederation.	At present under construction, or contract.
		From	To	Length in Miles.	Length in Miles.	Length in Miles.
1	Grand Trunk Railway—Main Line	Eastern Boundary of Province	Point Edward	457		
2	" " " Buffalo and Lake Huron Branch	Fort Erie	Goderich	158		
3	" " " London Branch	St. Mary's	London	23		
4	" " " Galt and Doon Branch	Galt and Doon	Berlin	7	4·5	
5	Great Western Railway—Main Line	Suspension Bridge	Detroit	229		
6	" " " Toronto Branch	Hamilton	Toronto	39·5		
7	" " " Wellington, Grey and Bruce	Harrisburgh	Southampton	27	102	
8	" " " Loop Line Division	Glencoe	Fort Erie		145	
9	" " " Sarnia Branch	London	Sarnia	61		
10	" " " London and Port Stanley Branch	"	Port Stanley	25		
11	" " " Brantford Branch	Harrisburgh	Brantford	8		
12	" " " Petrolia Branch	Wyoming	Petrolia	7		
13	" " " Wellington, Grey and Bruce S. Extension	Palmerston	Kincardine		66	
14	" " " London, Huron and Bruce Branch	London	Wingham		74	
15	" " " Brantford and Norfolk Branch	Brantford	Tilsonburgh		35·88	
16	Welland Railway	Port Colborne	Port Dalhousie	25		
17	Brockville and Ottawa Railway, and Perth Branch	Brockville	Carleton Place	57		
18	Canada Central Railway	Ottawa	Lake Nipissing	57	183	
19	St. Lawrence and Ottawa Railway, and Chaudière Branch	Prescott	Ottawa	59·5		
20	Toronto and Nipissing Railway	Toronto	Coboconk		88	
21	Northern Railway—Collingwood Line	"	Meaford	94	21	
22	" " Muskoka Branch	Barrie	Gravenhurst		53	
23	Midland Railway—Main Line	Port Hope	Midland City	65	54·53	
24	" " Peterborough Branch	Millbrook	Lakefield	13	9	
25	Whitby, Port Perry and Lindsay Railway	Port Whitby	Lindsay		46	
26	Cobourg, Peterborough and Marmora Railway—Marmora Line	Cobourg	Harwood	22		
27	" " " " Peterborough Line	Rice Lake	Chemong Lake		9	13
28	Toronto, Grey and Bruce Railway—Main Line	Toronto	Owen Sound		122	
29	" " " " Teeswater Branch	Orangeville	Teeswater		73	
30	Hamilton and North-Western Railway—Main Line	Port Dover	Barrie		137	
31	" " " " Collingwood Branch	Clarksville	Collingwood		40	
32	Canada Southern Railway—Main Line	Fort Erie	Amherstburg		229	
33	" " " St. Clair Branch	St. Thomas	Courtwright		62	
34	" " " Niagara Branch	Niagara	Fort Erie	30		
35	Kingston and Pembroke Railway	Kingston	Renfrew		80·32	22·68
36	Victoria Railway	Lindsay	Haliburton		55·81	

No.	NAME OF RAILWAY.	TERMINAL POINTS.		Completed prior to Confederation, July, 1867.	Completed since Confederation.	At present under construction, or contract.
		From	To	Length in Miles.	Length in Miles.	Length in Miles.
37	Port Dover and Lake Huron Railway	Port Dover	Stratford		63	
38	Stratford and Lake Huron Railway	Stratford	Wiarton		105·48	
39	Lake Simcoe Junction Railway	Stouffville	Jackson's Point		26·5	
40	Prince Arthur's Landing and Kaministiquia Railway	Prince Arthur's Landing	Fort William		6	
41	Grand Junction Railway	Belleville	Peterborough		64·65	
42	Canada Atlantic Railway	Province Boundary	Ottawa		68·08	0·64
43	Belleville and North Hastings Railway	Grand Junction Railway	Madoc		22	
44	Credit Valley Railway—Main Line	Toronto	St. Thomas		119·13	
45	" " " Branch Line	Streetsville	Elora & Orangeville.		62·83	
46	" " " London Branch	Belmont	London			11·50
47	North Simcoe Railway	Barrie	Penetanguishene		33·34	
48	Prince Edward County	Picton	Trenton at G. T. R.		32·44	
49	Central Ontario Railway	Trenton at G. T. R.	Wollaston			72
50	Huron and Erie Railway—Main Line	Rondeau Harbour	Sarnia or Forest on G. T. R.		28·20	31·80
51	" " " Branch Line	Dresden	Wallaceburg		11·54	
52	Georgian Bay and Wellington Railway	Palmerston	Durham		26	
53	Toronto and Ottawa Railway—Main Line	Peterborough	Casselman			182
54	" " " Manilla Link	Wick	Manilla		6·50	
55	" " " Omemee Link	Omemee	Peterborough		14	
56	Ontario and Sault Ste. Marie Railway	Sault Ste. Marie	Spanish River			125
57	Napanee, Tamworth and Quebec Railway	Napanee	Tamworth			30
58	Ontario and Quebec Railway	Toronto	Carleton Place			21·5
59	Bay of Quinté Railway	Deseronto	Grand Trunk R'y		3·50	
				1,464·00	2,383·23	703·62

It will be seen from the details given that $102\frac{80}{100}$ miles of railway have been completed and opened for traffic during the present year, and that $703\frac{60}{100}$ miles are yet under construction.

I have the honour to remain,

Your obedient servant,

ROBT. McCALLUM,

Engineer Public Works.

STATEMENTS

OF

THE ACCOUNTANT

AND OF

THE LAW CLERK

No. 1.—Expenditure for Fuel, Gas, Water, Repairs, etc., by the Department of Public Works, during 1883 (part of Maintenance Accounts).

NAME OF SERVICE.	Fuel, Gas, and Water, 1883.	Repairs, and Furniture and Furnishings, 1883.	Totals.
	$ c.	$ c.	$ c.
Government House	3,535 84	5,654 42	9,190 26
Executive Council and Attorney-General's Department	295 22	204 10	499 32
Public Works Department	295 21	190 39	485 60
East Wing, Parliament Buildings	1,547 04	1,883 31	3,430 35
Crown Lands Department, Parliament, Buildings	1,561 38	655 22	2,216 60
Legislation, Parliament Buildings	3,683 79	8,234 26	11,918 05
Maintenance of Locks, Dams, Slides, etc.	.....	5,838 86	5,838 86
Lockmasters, Bridgetenders, etc.....(Salaries)	.....	2,076 64	2,076 64
Superintendent of Locks, Dams, Slides, etc.....(Salary)	.....	1,200 00	1,200 00
General Clerk of Works and Repairs for Public Institutions.....(Salary)	.....	1,200 00	1,200 00
Totals	10,918 48	27,137 20	38,055 68

J. P. EDWARDS,

Accountant.

Department of Public Works,

Toronto, *2nd January, 1884.*

No. 2.—Statement of the Expenditure on Public Works in 1883, and Total Expenditure up to 31st December, 1883—(Capital Account.)

NAME OF WORK	Expenditure from 1st July, 1867, to 31st Dec. 1881,	Expenditure, 1882.	Expenditure, 1883.	Total.
	$ c.	$ c.	$ c.	$ c.
Government House	150,014 93	4,419 88	1,052 36	155,487 17
Parliament and Departmental Buildings	81,012 12	.....	.....	81,012 12
New Parliament Buildings	4,262 07	1,342 19	2,272 50	7,876 76
Asylum for the Insane, Toronto	247,166 79	4,890 67	824 46	252,881 92
do London	608,240 55	10,659 57	10,329 16	629,229 28
do Hamilton	322,732 47	9,245 85	19,674 67	351,652 99
do Kingston	153,238 38	20,072 29	27,908 24	201,218 91
Asylum for Idiots, Orillia	44,218 79	5,241 76	1,606 05	51,066 60
Deaf and Dumb Institute, Belleville	187,877 53	5,692 23	8,365 48	201,935 24
Blind Institute, Brantford	182,266 29	16,763 01	12,023 60	211,052 90
Provincial Reformatory, Penetanguishene	91,435 34	11,109 66	4,573 03	107,118 03
Central Prison, Toronto	530,863 57	4,083 77	3,182 41	538,129 75
Agricultural College, Guelph	224,953 99	15,353 09	12,400 68	252,707 76
School of Practical Science, Toronto (Old Building)	59,100 26	.....	.....	59,100 26
do do do (New Building)	43,676 47	1,464 34	3,638 96	48,779 77
Andrew Mercer Reformatory, Toronto	107,708 94	.....	.....	107,708 94
do do do	18,427 08	6,349 36	2,514 28	27,290 72
Normal and Model Schools, Toronto	58,511 17	2,853 38	1,761 93	63,126 48
do do Ottawa	138,118 76	1,217 79	1,978 46	141,315 01
Government Farm, Mimico	51,646 34	.....	.....	51,646 34
Osgoode Hall, Toronto	46,420 36	1,886 64	5,575 28	53,882 28
Brock's Monument	981 10	.....	717 65	1,698 75
Niagara River Fence	.....	2,330 66	4,343 82	6,674 48
Creameries, three, Establishment of	.....	.....	75 00	75 00
Muskoka District—Immigration Sheds at Gravenhurst	355 00	.....	.....	355 00
do Registry Office and Lock-up, Bracebridge	6,359 01	220 00	9 00	6,588 01
do Lock-up and Court Room at Huntsville	1,991 28	1,400 53	1,432 75	4,824 56
Algoma District—Court House and Registry Office, Sault Ste. Marie	7,934 24	.....	24 00	7,958 24
do Three Lock-ups, Grand Manitoulin Island	6,798 41	1,391 20	.....	8,189 61
Thunder Bay District—Registry Office and Lock-up, Prince Arthur's Landing	19,432 72	107 77	132 84	19,673 33
do Lock-up at Silver Islet, Lake Superior	2,268 79	36 00	.....	2,304 79
Parry Sound District—Registry Office, Lock-up, etc., Parry Sound	7,680 26	72 90	35 28	7,788 44
Nipissing District—Lock-up at Mattawan	2,547 20	116 48	28 01	2,691 69
Registry Office at Minden	2,987 50	.....	.....	2,987 50
New Territory—Lock-up and House at Moose Fort	.....	.....	.....	.....
Unorganised Territory—Court Room and Lock-up at Rat Portage	.....	4,578 00	10,713 15	15,291 15
Lock and Bridges, Port Carling, Muskoka	39,993 02	.....	.....	39,993 02
Lock at Young's Point	30,892 72	.....	.....	30,892 72
do Balsam and Cameron Lakes	23,959 02	.....	.....	23,959 02
do and Works, Mary's and Fairy Lakes	34,342 48	.....	7 632 00	41,974 48

Lock, Dam, etc., at Maganetawan	.....	.....	264 24	264 24
Cut and Bridge, Port Sandfield	14,146 09	.....	.....	14,146 09
Muskoss Falls Works	6,094 57	.....	.....	6,094 57
Muskoka Lakes Works	3,337 08	840 41	.....	4,177 49
Nipissing Lake Works	.....	.....	4,688 22	4,688 22
Mud Lake Works	.....	.....	.....	.....
Gull and Burnt Rivers Works	57,615 67	2,321 48	2,575 40	62,512 55
Muskoka River Works	38,198 93	.....	.....	38,198 93
Sydenham do	2,156 26	.....	.....	2,156 26
Nottawasaga do	5,915 09	.....	.....	5,915 09
Kaministiquia do	22,865 02	.....	.....	22,865 02
Scugog do (including Lock and Swing Bridges)	58,401 45	5,932 34	4,638 60	68,975 39
Pigeon do	4,999 62	.....	.....	4,999 62
Otonabee do	4,397 68	73 85	490 89	4,962 42
Balsam do	4,080 95	.....	.....	4,080 95
Wye do	5,176 98	.....	.....	5,176 98
Nation do	.....	.....	1,009 15	1,009 15
Trent River Bridge	2,000 00	.....	.....	2,000 00
Washago and Gravenhurst Road	32,792 12	.....	.....	32,792 12
Washago Wharf	489 22	.....	.....	489 22
Portage du Fort Bridge	4,997 99	.....	250 00	5,247 99
Des Joachim's Rapids, Bridge and Approaches	4,000 00	.....	.....	4,000 00
Surveys, Inspections, Arbitrations and Awards	25,051 75	2,006 47	6,044 61	33,102 83
Roads in Township of Ryerson	7,295 06	.....	.....	7,295 06
Clearings and Log-houses on Free-Grant Lands, Settlers' Homestead Fund	16,780 75	.....	.....	16,780 75
Aldborough Drainage Works	7,199 02	.....	.....	7,199 02
Brooke do	34,747 73	.....	.....	34,747 73
Delaware do	5,740 93	.....	.....	5,740 93
Dunwich do	10,105 86	.....	.....	10,105 86
Ekfrid, Caradoc, and Metcalfe Drainage Works	13,667 66	.....	.....	13,667 66
Grey Drainage Works	8,175 47	.....	.....	8,175 47
Moore do	17,091 58	.....	.....	17,091 58
Mosa do	12,714 75	.....	.....	12,714 75
Nissouri, West, Drainage Works	8,178 50	.....	.....	8,178 50
Raleigh do	36,409 64	.....	.....	36,409 64
Russell do	11,543 77	.....	.....	11,543 77
Sarnia do	40,540 55	.....	.....	40,540 55
Sombra do	53,169 04	.....	.....	53,169 04
Tilbury, East do	35,297 62	.....	.....	35,297 62
Tilbury, West do	31,577 06	.....	.....	31,577 06
Williams, East do	2,221 75	.....	.....	2,221 75
Surveys, and Drainage of Swamp Lands, Provincial Account	36,448 51	.....	.....	36,448 51
Totals	4,226,039 67	144,073 57	164,786 16	4,534,899 40

J. P. EDWARDS,
Accountant.

DEPARTMENT OF PUBLIC WORKS,
TORONTO, *2nd January, 1884.*

No. 3.—Contracts and Bonds entered into with Her Majesty in 1883.

Date.	Work.	Subject of Contract.	Contractor.	Sureties.	Amount.
1883.					$ c.
M'rch 10	Slide at Elliott's Falls, Gull River.	Timber for Improvements	Adam Hastings, of Elliott's Falls	Pine timber, 30 feet, per cubic foot. do under 30 ft. per cubic ft. Flatted hemlock, 30 ft. do do do 40 do Pine plank, per M.B.M. Oak timber do Maple Plank do	00 15 00 10 00 10 00 10 10 00 25 00 15 00
May 30	Blind Institute, Brantford	Addition to Water-closets, and additional tank for water-supply.	William Watt, of Brantford	William Young and Angus Murray	3,316 50
May 30	Deaf and Dumb Institute	Addition to Engine-house and sundry other works.	Terence McCabe, of Trenton	P. McCue and Marshall Morrison	3,125 00
June 2	Kingston Asylum	Additional storey to gas-house	Terence McCabe, of Trenton	Marshal Morrison and Hiram Lot	575 00
June 7	Court-Room and Lock-up at Huntsville.	Whole work.	William Proudfoot and Frederick Francis, of Huntsville.	Louis E. Kinton and J. W. Betts	2,300 00
June 9	Hamilton Asylum	Addition to kitchen, and other works.	John Dickenson and Edward Dickenson, jr., of North Standford.	David Young and Ed. Dickenson, Sr.	33,045 00
June 9	London Asylum	Coal-shed in rear of refractory ward.	John Purdom, of London	T. H. Purdom and Francis Love	2,290 00
July 5	London Asylum.	Addit'l building for religious services.	John Purdom, of London	T. H. Purdom and Francis Love	5,665 00
Aug. 3	Kingston Asylum	Steam boilers, steam-heating apparat's	Messrs. McKelvey & Birch, Kingston.	C. F. Gildersleeve and William Harty	9,030 00
Aug. 27	Osgoode Hall	Addition, west wing, and other works	John Herbert, of Toronto	Martin O'Connor and Wm. B. Malcolm	20,891 00
Aug. 28	Osgoode Hall	Steam-heating apparatus.	Messrs. Bennet & Wright, of Toronto	Robt. H. Ramsay and John B. Smith	7,712 00
Oct. 2	Hamilton Asylum	Iron-work for windows of cottage for acute patients.	S. N. Olmsted and R. G. Olmsted, of Hamilton.	Anthony Copp and Robert Chisholm.	2,700 00
Nov. 7	Lock and Channel at Maganetewan.	Whole work	M. Starrs, of Ottawa	Anthony Swalwell and P. A. Egleson	25,000 00

F. T. JONES,
Law Clerk.

Department of Public Works,
Toronto, *1st January, 1884.*

NINTH ANNUAL REPORT

OF THE

ONTARIO

AGRICULTURAL COLLEGE

AND

EXPERIMENTAL FARM,

FOR THE YEAR ENDING 31ST DECEMBER,

1883.

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1884.

NINTH ANNUAL REPORT

OF THE

ONTARIO AGRICULTURAL COLLEGE

AND

EXPERIMENTAL FARM.

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ONTARIO AGRICULTURAL COLLEGE, GUELPH.

REPORT OF THE PRESIDENT

OF THE

ONTARIO AGRICULTURAL COLLEGE,

GUELPH,

FOR THE

YEAR COMMENCING 1st JANUARY AND ENDING 31st DECEMBER,

1883.

Guelph, 2nd January, 1884.

To the Honourable A. M. Ross,
Commissioner of Agriculture.

Sir,—In presenting the Ninth Annual Report of the Ontario Agricultural College and Experimental Farm, I am unable to refer to anything striking or at all remarkable in the history of the Institution. Since the last meeting of the Legislature there has been no change in the Staff, the course of study, or the routine of work in the several Departments. Everything has gone on as usual; and only one or two items need more than a passing reference. The Chemical Department is better equipped than it was a year ago; the Natural History section of the Museum is much larger and more varied; the Library is more complete; and the Grounds in front and rear of the College have assumed an entirely new aspect.

The Attendance.

The most important matter to which I can here refer is, perhaps, the attendance; and, under this head, I scarcely know what to say, in order to present the facts of the case in such a way as not to be misunderstood.

For some time past there has been a growing feeling that we are admitting too many young men from Great Britain and other places outside of Ontario. It has been repeatedly said that the College is filled with English, Irish, Scotch, and everything but the sons of our Ontario farmers. Now, such statements, I wish to say, are very far from the truth, as the records clearly show; for the percentage of non-residents was only 24½ in 1881, and 29¾ in 1882, including, in both cases, all students from places outside of Ontario, whether from Quebec, New Brunswick, Nova Scotia, Prince Edward Island, or the old country.

We do not forget that the College is maintained by the people of this Province; and in our management we seek constantly to meet their wants and wishes. Nevertheless, some think that we injure the College by the admission of so many English boys; and for that reason I beg to explain the course which I have hitherto pursued.

Our tuition fee is $20 a year for residents, and $50 for non-residents. Applications from the Province of Ontario, if satisfactory, are accepted without delay; and those from other provinces and countries are generally held in abeyance till a short time before our Matriculation Examination, at which time—if the candidates from home are not sufficient to fill all vacancies—some of the applications from abroad are accepted. In this way Ontario always gets the preference, and non-residents are admitted only to fill the vacancies which are not required by our own people During the year 1883, however, I pursued a somewhat different course. I endeavoured more fully to comply with the wishes of those who so earnestly and persistently maintain that the legitimate, and the *only* legitimate, work of the College is to educate Ontario boys in the principles of Agriculture, Stock-raising, and the other subjects embraced in our curriculum. I wisely or foolishly decided to admit a smaller number from the old country; and consequently the attendance is a little less than it was a year ago. Within the last six months, I have, refused nearly forty applications from Great Britain; and it remains to be seen whether our farmers' sons will fill all vacancies in the course of a year or two.

Course of Study.

I need scarcely add that our course of study is specially designed for farmers' sons, as we find them in this country. A course making some provision for Classics or Modern Languages would be preferred by those who are still in doubt as to the occupation which they may ultimately decide to follow; and a purely technical course would be more acceptable to old country boys, who generally have a very fair English education before they leave home. But with our Canadian farmers' sons the case is different. Their early education, if they decide to remain on the farm, is very generally neglected; and a course of study intended to meet their wants should not be so narrow in its range as to embrace only a few technical subjects, nor so wide as to include Classics and Modern Languages. It should be both special and general to a limited extent—the former, to assist them in making a living; and the latter, to fit them for the discharge of their duties as citizens. Recognizing this fact, we have all along given prominence to Agriculture, Chemistry, Veterinary Science, and other branches that have a direct bearing on the work of an agriculturist as such; and, at the same time, we have insisted on the study of English Literature, Composition, and Political Economy, to assist in fitting our students for taking their part in the municipal, political, and religious work of the country to which they belong.

Management.

The general management of the Ontario Agricultural College and Experimental Farm is divided between the President and the Farm Superintendent, who are to a large extent independent of each other. The former has full control of the College, and the latter of the Farm. Each is required to work for the other; but neither is responsible for the discharge of his duties to anyone but the Commissioner of Agriculture.

THE FARM.

The work under this head is divided into three departments:—

I.—The Farm Department.
II.—The Live Stock Department.
III.—The Experimental Department.

For the revenue, expenditure, and entire management of these, and of the Mechanical Department also, my colleague Professor Brown is responsible. He buys, sells, hires the men, directs the foreman, and does whatever else he thinks necessary for the accomplishment of the objects aimed at; and his report, in Part VI. of this volume, contains an able and exhaustive statement of the work done in these departments during the past year.

THE HORTICULTURAL DEPARTMENT.

The management of this department, which is fast becoming one of the heaviest and most important departments of the Institution, has lately been transferred to our gardener Mr. Forsyth, who has thereby become directly responsible to the Commissioner of Agriculture for the Lawn, Gardens, Orchards, and Arboretum. In the matter of revenue and expenditure, Mr. Forsyth is amenable to the Commissioner alone; but, in the work of the department, he is guided to some extent by a Special Committee of the Fruit Growers' Association, whose account of the year's operations will be found with Mr. Forsyth's report at the end of this volume.

THE COLLEGE.

For convenience and systematic treatment, the work in the College may also be considered under three heads:—

I.—The Course of Instruction in the College.
II.—The Boarding House and College Buildings.
III.—The Business Department.

The routine in each of these varies very little from year to year. There are no experiments to be described; no important results to be announced; nothing new to tell: consequently, when called on to give an account of my stewardship for another year, I feel very much like a man undertaking to preach for the fourth time on the same text, every point of which was exhausted in his first discourse. Be that as it may, I beg to report as follows:—

I.—THE COURSE OF INSTRUCTION IN THE COLLEGE.

Before proceeding to the work of 1883, I may give the sessions and terms into which the year is divided, a list of the subjects taught, and the names of the professors and lecturers, with the work allotted to each; after which I shall speak of the year's operations as a whole, and then of each term separately.

The scholastic year commences on the 1st October and ends on the 31st August. It is divided into two sessions, and each session into two terms.

Sessions.

Winter Session, embracing the Fall and Winter Terms—1st October to 31st March.
Summer Session, embracing the Spring and Summer Terms—16th April to 31st August.

Terms.

Fall Term—1st October to 22nd December.
Winter Term—5th January to 31st March.
Spring Term—16th April to 30th June.
Summer Term—1st July to 31st August.

Subjects Taught.

The regular course of study extends over a period of two years, and includes the following subjects:—

First Year.—Agriculture, Live Stock, Inorganic Chemistry, Organic Chemistry, Geology and Physical Geography, Structural and Physiological Botany, Physiology, Zoology, Veterinary Anatomy, Veterinary Materia Medica, English Literature and Composition, Book-keeping, Arithmetic, and Mensuration.

Second Year.—Agriculture, Live Stock, Arboriculture, Agricultural Chemistry, Meteorology, Systematic and Economic Botany, Entomology, Horticulture, Veterinary Pathology, Veterinary Surgery and Practice, English Literature, Political Economy, Book-keeping, Mechanics, Levelling and Surveying.

Method of Instruction.

The method of instruction is chiefly by lectures. Authors are read and studied in connection with the lectures on English Literature, Political Economy, and Systematic Botany; but in the other subjects, text-books are not used in the class-room, except for occasional reference.

THE STAFF.

1. James Mills, M.A., *President.*

English Literature and Political Economy.

2. William Brown, C.E., P.L.S.

Agriculture, Live Stock, and Arboriculture.

3. R. B. Hare, B.A., Ph.Dr.

Inorganic, Organic, Agricultural, and Analytical Chemistry; Geology; Physical Geography; Meteorology.

4. J. Playfair McMurrich, M.A.

Physiology; Zoology; Structural, Physiological, Systematic, and Economic Botany; Horticulture; Lectures on English.

5. Frederick Grenside, V.S.

Veterinary Anatomy, Pathology, Materia Medica, and Obstetrics; Practical Handling and Judging of Horses.

6. E. L. Hunt, Third Year Undergraduate, University of Toronto.

Arithmetic, Mensuration, Mechanics, Levelling, Surveying, and Book-keeping; Lectures on English.

THE YEAR 1883.

As already intimated, the history of the College during the year 1883 is little else than a record of ordinary exercises and incidents, such as have been reported from year to year. The work in the several departments has gone on as usual, and the progress made has been no less substantial and satisfactory. We have made very considerable additions to the museum, especially in the department of Natural History. The Professor of Chemistry has been provided with new apparatus for the analysis of soils, milk, and manures; and we have, for the first time, got a complete catalogue of our library made out and printed.

Hitherto we have admitted students twice a year—in October and April; but this practice has led to some irregularity and trouble, that ought to be avoided; and I hope ere long to be in a position to adopt the rule which prevails in all other colleges of admitting only once a year.

There is no falling off in the number of applicants for admission; but the attendance is a little less than it was in 1881 and 1882, owing to the fact already stated, that is, the determination on our part to be guided to some extent by the views of those who insist that the admission of so many wealthy men's sons from England and elsewhere, has a tendency to prevent the plain, unsophisticated youth of our own Province from entering the College.

Attendance.

The number on the roll in 1883 was 202, representing several foreign countries, twenty-nine Counties of Ontario, and five other Provinces of the Dominion, as follows: from India, 1; the United States, 2; Wales, 2; Manitoba, 3; Ireland, 4; Scotland, 4; New Brunswick, 6; Nova Scotia, 7; the Province of Quebec, 16; England, 20; and Ontario, 134; —67 per cent. of residents, and 33 of non-residents. See College Roll, appendix 1.

Counties, etc.	*Students.*	*Counties, etc.*	*Students.*
Brant	3	Montreal	6
Bruce	4	New Brunswick	6
Carleton	4	Northumberland	5
Durham	2	Nova Scotia	7
Elgin	6	Ohio, U. S.	1
England	20	Ontario	2
Frontenac	1	Ottawa	10
Grey	4	Oxford	3
Glengarry	4	Peel	1
Hamilton	2	Perth	7
Hastings	2	Peterborough	4
Huron	1	Prince Edward County	2
India	1	Prince Edward Island	3
Ireland	4	Quebec (City)	3
Kent	2	Quebec (Province)	6
Kingston	3	Simcoe	15
Lambton	3	Scotland	4
Lanark	1	Toronto	10
Leeds	4	Victoria	1
Lincoln	1	Wales	2
London	1	Welland	1
Manitoba	3	Wellington	10
Massachusetts, U.S	1	Wentworth	3
Middlesex	3	York	9

Total number of students in 1883	202
Number of Ontario counties represented	29

In 1882, the County of Simcoe sent the largest number of students; and in 1883, it had a representation of 15, which is one-half larger than that of any other county. Wellington sent 10; the cities of Toronto and Ottawa, 10 each: York, 9; Perth, 7; Elgin, 6; Northumberland, 5; Bruce, Carleton, Grey, Glengarry, Leeds and Peterborough, 4 each; Brant, Lambton, Middlesex, Oxford, Wentworth, and the City of Kingston, 3 each; Durham, Hastings, Kent, Ontario, Prince Edward, and the City of Hamilton, 2 each; and several other counties and cities, 1 each.

Religious Denominations.

Under this head, it may be observed that the College is patronized by members and adherents of nearly all the religious organizations in the Dominion. Last year there were eleven denominations represented in our class-lists, as follows:—

Episcopalians	90	Lutherans	2
Presbyterians	49	Plymouth Brethren	2
Methodists	36	Universalists	1
Baptists	8	Unitarians	1
Roman Catholics	7	Swedenborgians	1
Congregationalists	5		
		Total	202

LECTURES.

Lectures commenced on the 1st October and continued throughout the first three terms of the scholastic year 1882-'83—from the 1st October to the 30th June; during which time all our regular students were engaged in class-room work and manual labour alternately—three hours a day having been spent at the former, and from three and a half to five at the latter. To this were added five hours in two weeks for set-up drill and gymnastics, under Adjutant Clarke, the very efficient drill instructor of the Ontario and Wellington Field Batteries; so that the daily routine of every student in the regular course, for nine months of the year, was—

Lectures in the College, three hours a day (excepting Saturdays).
Manual Labour outside, three and a half to five hours a day, according to the season of the year.

Study in room, two hours a day.
Drill and gymnastics, one hour a day (for five days of every alternate week).

While the first year students were at lectures in the College, the second year students were employed outside. Those who went out to work in the forenoon, came in for lectures in the afternoon, and *vice versa*. Thus the theoretical work inside and the practical work outside went on simultaneously during the Fall, Winter and Spring Terms. The Summer Term (1st July to 31st August) was devoted entirely to work in the outside departments—the farm, the live stock, the garden, the carpenter-shop and experiments.

In order to place systematically and clearly before the readers of this report an outline of the literary work done in the Institution, I beg to submit the following syllabus of lectures delivered by the professors in the several departments and sub-departments of study during the scholastic year, commencing on the 1st October, 1882, and ending on the 31st August, 1883:—

Outline of Class-room Work.

Scholastic Year 1882-83.

(1st October to 30th June.)

FIRST YEAR.

Fall Term—1st October to 22nd December.

DEPARTMENT 1.—AGRICULTURE.

Introductory.—Ancient and modern agriculture; agricultural literature; arts and sciences affecting agriculture; different kinds of farming.

Reclamation of Land.—Clearing, stumping, stoning, fallowing, etc.

Soils.—Origin and distribution of soil; natural conditions of soil and plant; examination and classification of soils; physical and chemical properties of each kind.

Rotation in Cropping.—Importance and necessity of rotation: principles underlying it; rotations suitable to different kinds of soil; examination and criticism of different systems of rotation.

Buildings.—Location of house, barn and stables; framing a building: stables for horses, sheep and cattle; arrangement of farm buildings.

Implements and Machinery.—Principles in construction of implements and machinery: points to be aimed at; classification, examination, and description of the same.

Miscellaneous.—Roads, lanes, fences, wells, etc.

Department 2.—Science.

Chemical Physics.—Matter; accessory and essential properties of matter; attraction; various kinds of attraction—cohesion, adhesion, capillary, electrical, and chemical; specific gravity; weights and measures; heat, measurement of heat, thermometers, pyrometers, specific and latent heat; sources, nature and laws of light; spectrum analysis.

Inorganic Chemistry.—Scope of subject; elementary and compound substances; chemical affinity; symbols; nomenclature; combining proportions by weight and by volume; atomic theory; atomicity and basicity; oxygen and hydrogen; water—its nature, functions, decomposition and impurities; nitrogen; the atmosphere—its composition, uses and impurities; ammonia—its sources and uses; nitric acid and its connection with plants; carbon; combustion; carbonic acid and its relation to the animal and vegetable kingdom; sulphur and its compounds; manufacture and uses of sulphuric acid; phosphorus; phosphoric acid and its importance in agriculture; chlorine —its bleaching properties; bromine; iodine; silicon; potassium; calcium; magnesium; iron, &c.

Zoology.—Definition of terms morphology, physiology, embryology, etc.; distinctions between animate and inanimate objects; life distinctions between plants and animals; definition of general terms; development; basis of classification; characters of the various classes, with a more detailed and special account of the porifera or sponges; actinozoa, including the formation of coral islands; trematoda, including the "liver-fluke"; cestoda, with a description of the life-history of the common tape-worm, and of the form causing "staggers" in sheep; nematoda, including thread worms, trichina, wheat anguillula, cause of gapes in chickens, etc.; acanthocephala; oligochæta—formation of mould by earth-worms; hirudinea lamellibranchiata, including edible molluscs and pearl fisheries; gasteropoda; cephalopoda.

Department 3.—Veterinary Science.

Anatomy and Physiology of the horse, ox, sheep and pig; osseous system, muscular system, syndesmology, plantar system, and odontology.

Department 4.—English.

Lectures on Composition.—The sentence, the paragraph, and the period; capitals and punctuation; style—its qualities and varieties. *Exercises in Composition.*

English Classics.—Critical study of Goldsmith's "Deserted Village."

Department 5.—Mathematics.

Arithmetic.—Review of subject, with special reference to farm accounts: tables of weights and measures discussed; interest, discount, stocks and partnership.

Mental Arithmetic.—Calculations in simple rules, fractions, and compound rules.

FIRST YEAR—(Continued)

Winter Term—5th January to 31st March.

Department 1.—Agriculture.

Breeding, rearing, and feeding of animals. Points to be considered in deciding what kind of animals to keep.

Horses.—Different breeds of horses, and leading characteristics of each; type of horse required for farm work; breeding, feeding and general management.

Cattle.—History and characteristics of Shorthorns, Herefords, Polled Angus, Ayrshires, Jerseys, Devons, Galloways, etc.; grade cattle; milch cows----points of a good milch cow; breeding generally, cross-breeding, in-and-in breeding; pedigree.

Sheep.—Breeds of sheep generally considered; long-woolled sheep; medium-woolled sheep; short-woolled sheep; crosses between different breeds compared; texture; quality, quantity, and uses of different kinds of wool.

Swine.—Characteristics of various breeds; management of sows; stores; bacon-curing, etc.

Department 2.—Science.

Inorganic Chemistry.—Subject continued from Fall Term.

Organic Chemistry.—Constitution of organic compounds; alcohols, aldehydes, acids and their derivatives; formic, acetic, oxalic, tartaric, citric, lactic, malic, uric and tannic acids. Constitution of oils and fats----saponification; sugars, starch, cellulose; albuminoids, or flesh formers and their allies; essential oils; alkaloids----morphine and quinine; classification of organic compounds.

Zoology.—Study of various classes continued; arthropoda, with special attention to structure and habits of the arachnida, acarina and insecta; general structure of the vertebrata; distinctions between vertebrata and invertebrata; pisces; amphibia; reptilia—treating especially of the snakes and turtles; aves—habits and appearance of the more important insectivorous birds; mammalia, with special attention to the orders containing useful and domestic animals; anthropomorpha; man.

Lectures illustrated by specimens, diagrams, and drawings on the black board.

Department 3.—Veterinary Science.

Veterinary Anatomy.—Anatomy and physiology of the horse, ox, sheep, and pig—digestive system, circulatory system, respiratory system, urinary system, nervous system, sensitive system, generative system, tegumental system.

Department 4.—English.

Lectures on Composition continued.—Common mistakes in speaking and writing discussed and corrected; most important figures of speech defined and illustrated.

Exercises in Composition continued.—Exercises in synthesis; abstracts of speeches and essays; letter writing.

English Classics.—Committing to memory and critical study of Scott's "Marmion," Cantos V. & VI.

Department 5.—Mathematics and Book-keeping.

Arithmetic.—Equation of payments; percentage; profit and loss; stocks; partnership; alligation, exchange.

Book-keeping.—Business forms and correspondence; general farm accounts; dairy, field and garden accounts.

FIRST YEAR—(Continued).

Spring Term—16th April to 30th June.

Department 1.—Agriculture.

Preparation of Soil.—Modes of preparation for different crops, as wheat, barley, oats, rye, pease, maize; modes suited to various kinds of soil.

Seeds and Sowing.—Testing the quality of seed; changing seed; quantity of seed per acre; methods of sowing.

Improvement of Lands.—Ordinary cultivation ; subsoiling in some cases ; fallowing : draining ; manuring. Farm yard manure, and management of the same ; the properties, application and uses of artificial manures—lime, plaster, salt, bone-dust, superphosphates, etc.

Roots.—Cultivation of roots and tubers—turnips, mangolds, carrots, potatoes ; effects of each kind on soil.

Green Fodders.—Tares, lucerne, sainfoin, prickly comfrey, clovers, grasses ; the cultivation and management most appropriate for each.

Management of pastures ; harvesting and preparing crops for markets or one's own use ; crops of current year examined.

Department 2.—Science.

Geology.—Connection between geology and agriculture ; classification of rocks—their origin and mode of formation, changes which they have undergone after deposition : fossils—their origin, inferences from their presence in rocks ; geological periods and the characteristics of each. Geology of Canada, with special reference to the nature and economic value of the rock deposits ; glacial period and its influence in the formation of soil. Lectures illustrated by numerous diagrams and specimens.

Physical Geography.—Scope of the subject—earth's place in space, external and internal conditions, atmosphere, ocean, land ; superficial configuration of Ontario ; theory of springs ; classification of lakes ; zones of animal and vegetable life.

Botany.—Derivation and definition of word ; definition of morphology ; vegetable physiology ; botanical geography ; palæophytology ; history of the growth of the science : structure of plant—cells as individuals, cells aggregated into tissues ; fibro-vascular bundles; roots—structure and physiology ; stem—structure in exogens and endogens, growth of stem, branching, varieties of stem ; leaves—structure, chlorophyll, stomata, hairs, shape, venation, compound leaves, phyllotaxis ; flower—arrangement, structure, calyx, corolla, stamens, pistils, foliar nature of parts, fertilization, natural provisions for cross-fertilization, development ; fruit—classification of fruits ; germination of seeds. Physiology—proximate principles of plants ; nutrition ; metastasis ; insectivorous plants ; respiration ; motion ; heliotropism and geotropism ; irritability ; influence of temperature.

Lectures illustrated by specimens, diagrams and drawings on the black board.

Department 3.—Veterinary Science.

Materia Medica.—The preparation, doses, action, and uses of about one hundred of the principal medicines used in veterinary practice.

Department 4.—English.

Lectures on the subject, and class-room exercises in business correspondence, etc.

English Classics.—Committing to memory and critical study of Washington Irving's "Sketch Book."

Department 5.—Mathematics.

Mensuration.—Mensuration of surfaces—the square, rectangle, triangle, trapezoid, regular polygon, circle, sector, segment, etc. Special application to the measurement of lumber. Mensuration of solids—tetrahedron, cube, prism, cylinder, spherical segment, spherical zone, parabolid, frustum of parabolid, spheroid, circular segment of spheroid, etc. Special application to the measurement of timber, earth, etc.

SECOND YEAR.

Fall Term—1st October to 22nd December.

Department 1.—Agriculture.

Experimental Plots.—The results of last season's experiments with wheat, oats, barley, peas, grasses, clovers, roots, etc. : liability to disease ; effects of various manures on different crops ; growth of plants, etc.

Farm Management.—Detailed account of the treatment of each field; results from different kinds of seed and soil; effects of manure; harvesting, storing, and threshing of crops; fall ploughing; subsoiling, etc.

Stock Feeding.—Value of feeding materials; estimate for winter keep of live stock; housing, feeding, and fattening; points to be observed in selecting animals for fattening; feeding experiments; common diseases of animals; management of animals on pasture; value of green fodder. Dairy management and cheese-making.

Department 2.—Science.

Agricultural Chemistry.—Connection between chemistry and agriculture; the various compounds which enter into the composition of the bodies of animals; the chemical changes which food undergoes during digestion; chemical changes which occur during the decomposition of the bodies of animals at death; the functions of animals and plants contrasted; food of plants, and whence derived; origin and nature of soils; classification of soils; causes of unproductiveness in soil and how detected; composition of different plants in relation to the soils upon which they grow; rotation of crops; preservation, development, and renovation of soils; manures classified, the chemical action of manures on different soils; chemical theories in reference to the action of superphosphates; the action of lime in the decomposition of double silicates; feeding of animals; classification of foods; chemical results in the use of different foods; points necessary to be considered in order to obtain the full value of artificial and natural foods.

Meteorology.—Relation of Meteorology to Agriculture; composition and movements of the atmosphere; nature and manipulation of the barometer, its importance in forecasting the weather; temperature, description of the various instruments used in its measurement and how to use them; solar and terrestrial radiation; the influence of forests on climate; mists, fogs, clouds, rain, hail and snow; description of instruments used in measuring rain and snow-fall; velocity and direction of wind; causes affecting climate; influence of climate on vegetation.

Department 3.—Veterinary Science.

Pathology.—Osseous System.—Nature, causes, symptoms, and treatment of diseases of bone, as splint, spavin, ringbone, etc.

Muscular System.—Nature, causes, and treatment of flesh wounds, etc.

Syndesmology.—Nature, causes, symptoms, and treatment of bog-spavin, curb, and other diseases of the joints.

Plantar System.—Nature, causes, symptoms and treatment of corns, sand-crack, founder, and other diseases of the foot.

Odontology.—Diseases of the teeth and treatment of the same.

Department 4.—English.

Lectures.—Etymological, syntatical, and rhetorical forms of the English language; history of its formation, its connection with other languages; rhetorical figures; their use and abuse; prose and poetic diction.

Composition.—Essay writing; familiar and business correspondence.

English Classics.—Critical study of Shakespeare's "Julius Cæsar."

Department 5.—Mathematics.

Statics.—The mechanical powers; friction; the steam engine; strength of materials; units of work; etc.

Drainage.—General principles; discharging water-ways; how, where, and when to commence draining; depth of drains and distances apart; furrow drains; draining, followed by other improvements; drainage implements; levelling.

SECOND YEAR—(Continued).

Winter Term—5th January to 31st March.

Department 1.—Agriculture.

Laws affecting agriculture; capital required in farming, laying out of farm; general management and economy; measuring, levelling, and draining; permanent pastures; inventory and valuation; cost of production; buying, selling, and marketing; field experiments.

Management of cattle, sheep, and other animals in winter; breeding generally considered; special management of ewes before, during and after the season of lambing; treatment of other animals in parturition; rearing of lambs, calves, and pigs; washing and dipping sheep, etc., etc.

Arboriculture.—Planting and attendance of forest trees, shade trees, etc.

Department 2.—Science.

Agricultural Chemistry.—Subject continued from Fall Term.

Entomology.—Importance of the study to agriculturists; natural checks to insect ravages; system of nomenclature; anatomy of insects—appendages, respiration, nutritive and nervous systems; metamorphosis; classification; beneficial and injurious insects—their habits and the best means of checking the ravages of the latter—lectures illustrated by specimens.

Department 3.—Veterinary Science.

Digestive System.—Nature, causes, symptoms, and treatment of spasmodic and flatulent colic, inflammation of the bowels, acute indigestion, tympanitis in cattle, impaction of the rumen, and many other common diseases.

Circulatory System.—Description of the diseases of the heart and blood vessels.

Respiratory System.—Nature, causes, symptoms, and treatment of catarrh, nasal-gleet, roaring, bronchitis; pleurisy, inflammation of the lungs, etc.

Urinary System.—Nature, causes, symptoms, and treatment of inflammation of the kidneys, etc.

Nervous System.—Nature, causes, symptoms, and treatment of lock-jaw, string-halt, etc.

Sensitive System.—Nature, causes, symptoms, and treatment of the diseases of the eye and ear.

Generative System.—Nature, causes, symptoms, and treatment of abortion, milk-ever, etc.

Tegumental System.—Nature, causes, symptoms, and treatment of scratches, sallenders, mallenders, parasites, and other diseases of the skin.

Department 4.—English Literature and Political Economy.

Lectures.—Lectures on accuracy, purity, propriety, clearness, precision, strength, and grace; varieties of style described: false syntax discussed and corrected.

Composition.—Exercises in impromptu composition and letter writing continued.

English Classics.—The critical study of Shakspeare's "King Richard the Second."

Political Economy.—Utility; production of wealth—land, labour, capital; division of labour; distribution of wealth; wages; trades-unions; co-operation; money; credit, credit cycles; functions of government; taxation; etc.

Department 5.—Mathematics.

Dynamics.—Motion, forces producing motion, momentum, etc.

Hydrostatics.—Transmission of pressure; the hydraulic press; specific gravity, density; pumps, siphons, etc.

Road-Making.

SECOND YEAR—(Continued).

Spring Term.—16th April to 30th June.

Department 1.—Agriculture.

Review of all past lectures with special drill on outside work. Reasons for management, etc.

Department 2.—Science.

Practical and Analytical Chemistry.—Chemical manipulation; preparation of common gases and reagents; operations in analysis—solution, filtration, precipitation, evaporation, distillation, sublimation, ignition, and the use of the blow-pipe; testing of substances by reagents; impurities in water; adulteration in foods and artificial manures; injurious substances in soils.

Quantitative analysis of soils, manures and farm produce.

Systematic and Economic Botany.—Definition of the terms; importance of classification; requisites of a good classification; classification of plants, character of the more important orders; description of source and preparation of the various economic products obtained from plants. The course was illustrated by a large collection of plants and also by practical field-work, in which various plants were examined, dissected, and classified by the students.

Horticulture.—Ontario as a fruit-growing country; influence of climate, soil, topography; source of our commoner fruits; improvement by selection; Van Mon's theory; cross fertilization—physiology, extent to which it can be carried; duration of cultivated varieties; grafting and budding—objects of operations, methods, extent to which operations can be carried; influence of graft on stocks; layering; propagation by suckers; propagation by pieces of root; pruning—objects of operation, physiology, root-pruning, other methods of producing fruitfulness; training—objects of operation, methods; transplanting—physiology, time of year to be practised, operation, mulching, manuring, laying in by the heels; winter care of plants; diseases of plants—produced by changes in the external conditions of plants, poisonous gases in the atmosphere or soil, growth of parasitic plants, injuries from insects; points to be considered in the selection of trees.

Department 3.—Veterinary Science.

Materia Medica.—The preparation, actions, uses, and doses of medicines—continued from the Spring Term of the first year. Lectures on special subjects such as pleuro-pneumonia, the rinderpest, tuberculosis, etc.

Veterinary Obstetrics.—Description of fœtal coverings. Phenomena in connection with puberty, œstrum, gestation, sterility, abortion, normal and abnormal parturition. Diseases incidental to pregnant and parturient animals.

Department 4.—English.

Lectures.—Taste, characteristics of taste, standard of taste; pleasures of the imagination—their sources, viz., the novel, the wonderful, the picturesque, the sublime, the beautiful; wit, humour, ridicule, etc.

Composition.—Business forms, correspondence, general letter writing, etc.

English Classics.—The critical study of Milton's "L'Allegro" and "Il Penseroso."

Department 5.—Mathematics and Book-keeping.

Surveying.—Fields surveyed with chain and cross-staff; heights and distances found.

Book-keeping.—Review of previous work; laws relating to farming—deeds mortgages, notes, etc., with laws relating thereto.

Having thus briefly outlined the work of the year, as a whole, I may now proceed to report more at length on the work of each term separately.

The scholastic year began on the 1st October, 1882, and ended on the 31st August, 1883. The first term of the year, i. e., the Fall Term, having been treated of in our report of 1882, I shall begin with the

Winter Term, 1883.

5th January to 31st March.

The students in attendance were those who had entered at the beginning of the Fall Term in October, 1882, or previous to that date—112 in number; and the work was to a large extent a continuation of the subjects begun at that time.

Class-Room Work.

The term was ten weeks and three days long, exclusive of the time spent on the Easter Examinations; and the lectures delivered, were as follows:—

First Year—	31	lectures,	one hour each,	on Agriculture and Live Stock.
	32	"	"	" Chemistry.
	21	"	"	" Zoology.
	21	"	"	" Veterinary Anatomy.
	21	"	"	" English Literature.
	11	"	"	" English Composition.
	21	"	"	" Arithmetic.
	158			
Second Year—	16	lectures,	one hour each,	on Agriculture and Live Stock.
	5	"	"	" Arboriculture.
	31	"	"	" Agricultural Chemistry.
	11	"	"	" Entomology.
	21	"	"	" Political Economy.
	11	"	"	" English Literature.
	10	"	"	" English Composition.
	21	"	"	" Veterinary Pathology.
	21	"	"	" Dynamics, Hydrostatics, and Road-making.
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Also one hour a week was spent by the second year students in the practical handling and judging of horses, under the supervision of Dr. Grenside, our Veterinary Surgeon.

Department 1.—Agriculture and Live Stock.

In this department, the first year students devoted three hours a week to the study of the characteristic points and peculiarities of the leading breeds of sheep, pigs, and horses, while the second year men spent six hours on general agriculture, five hours on arboriculture, and eleven hours in handling, judging, and comparing the different breeds and varieties of sheep and cattle. Under the last head, the method of instruction was the same as usual, and may be described as follows:

A specimen of some kind, say a Shorthorn steer, is brought into the lecture-room, which is so arranged with galleried seats that every student while in his place taking notes has a full view of the lecturer and all his movements. The different parts of the animal are first pointed out and named, such for example, as the brisket, crops, loins, twist, etc. After this has been several times repeated, the students are called on to point out and name the several parts in presence of their class-mates. The lecturer then criticises the animal more closely, indicating the strong and the weak points, and giving his estimate of it as a whole. Afterwards several animals of different breeds are brought in together, and he proceeds to describe and illustrate what are considered the good points

of the animal for beef and for milk, comparing and contrasting Shorthorns, Herefords, Aberdeen Polls, Devons, Galloways, Ayrshires, and Jerseys—breed with breed in regard to shape of frame, quality of flesh, feeding, beefing, milking, hardiness, and other properties. Much the same course is pursued with the different breeds of sheep. Cotswolds, Leicesters, Southdowns, Oxford Downs, Shropshire Downs, and Merinos are frequently examined in the class-room, and compared with one another as regards carcass, constitution, wool, mutton, feeding, hardiness, etc. Thus the instruction in this department is made in the strictest sense definite and practical.

Department 2.—Natural Science.

The work of the Winter Term in this department embraces Inorganic Chemistry, Organic Chemistry, and Zoology, with the first year students; Agricultural Chemistry, and Entomology with the second year.

The first year students spent a few weeks in completing the Inorganic Chemistry which they had studied throughout the Fall Term, and then took up the more difficult, but no less interesting subject of Organic Chemistry. They had a full course of lectures from Dr. Hare, on the most important organic compounds, and gave special attention to the nature and sources of starch, sugar, oils, fats, the albuminoids, or flesh-formers, and other substances which have a more or less direct bearing on general agriculture and the feeding of animals. At the same time they attended Professor McMurrich's very interesting lectures on Zoology, to get a general knowledge of the animal kingdom as a whole, and thereby fit themselves for becoming more intelligent and appreciative students of particular parts of that kingdom under the heads of Entomology and Veterinary Science.

The second year students were at the same time engaged in the study of Agricultural Chemistry and Entomology. During the previous term they had learned the relation of Chemistry to Agriculture and stock-raising; and with this knowledge they now proceeded to study the nature and sources of plant food, the origin and properties of the different kinds of soil, their preservation and renovation, the causes of unproductiveness, the properties and uses of various manures, the chemical composition of a number of fodders, and the nutritive value of each. On subjects such as these, they spent three hours a week; and at the same time took a course of lectures delivered by the Professor of Biology, on the marks, habits, and depredations of the various insects that infest our crops and fruits, seeking especially to learn the best means of checking and preventing their ravages.

A more detailed account of the work in the several sub-departments under this head will be found in the reports of Dr. Hare and Professor McMurrich, in parts II and III of this volume.

Department 3.—Veterinary Science.

As will be seen from the syllabus of lectures given on a previous page, the Winter Term in the Veterinary Department is devoted to the anatomy, physiology, and pathology of the horse, ox, sheep, and pig. The lectures to the first year students were on the anatomy and physiology of these animals, and were illustrated by the complete skeleton of a horse and portions of other skeletons. The second year lectures discussed various diseases and their treatment, especially the common ailments of the horse, as spavin, ringbone, curb, founder, inflammation, and such like; and, for the purpose of making the instruction thoroughly practical, horses were regularly brought into the class-room and examined, first by the professor in the presence of the class, and afterwards by the students themselves. In this way the veterinary surgeon was each day enabled to see whether his lectures were really understood or not by those to whom they were delivered.

The work of the year in this department embraced not merely the lectures in the College, but also the medical treatment of all the stock kept on the Farm. This, of course, gave the Professor of Veterinary Science a good deal of extra work; but it afforded him an opportunity of observing carefully the action of one or two diseases, to which stock in this country is more or less liable. On the whole, I may say our stock s healthy, and has hitherto suffered very little from ailments of any kind. Some of our

cattle have now and then been troubled with what is commonly called "foul in the foot," and very young lambs occasionally with goitre; but nothing serious has resulted from these causes. Not so, however, with tuberculosis and tape-worm. The former has caused the death of three or four of our best cows in the course of a few years, and the latter made sad havoc of our lambs last spring. I beg, therefore, to refer you, Sir, and all our readers to Dr. Grenside's valuable report in Part III. of this volume, in which you will find a full discussion of the causes, symptoms, and treatment of these diseases. Allow me also to ask your favorable consideration to what is there said by Dr. Grenside regarding the work, wants, and claims of the Veterinary Department.

Department 4.—English Literature and Political Economy.

Regarding this department, I have to say as I did last year, that our course of study is still the same, and the same subjects are emphasised. We spend no time on any foreign language; and not much on anything which has not a direct bearing on the ordinary duties of a Canadian farmer. The time may come when it will be proper to add Drawing, Elocution, and perhaps French or German to the list of studies; but at present it seems wise to resist the temptation in that direction. We give all the subjects of the programme a fair share of attention, but lay most stress on Agriculture, Live Stock, Chemistry, and Veterinary Science. Our primary aim is to make good practical farmers; but we are not forgetful of the fact that it is no less important to make good citizens—to add some of the graces and refining influences of a broader culture, and thereby fit our students for filling positions of trust, influence, and respectability in Church and State.

The kind of education which enables a man to make the most of his abilities in the social circle, the municipality, or the political arena, is not got by confining the attention to any single subject, but by reading, writing, and conversation, with the sharpening and refining influence of many studies. At the same time, I think there is nothing else which contributes so much to that end, and tends so directly to create and foster a taste for reading, as frequent practice in composition and the critical reading of selections from classic authors; and for this reason we devote all the time we can spare to exercises of that kind.

During the Winter Term of 1883 the first year students spent one hour a week on exercises in composition, and two hours in the critical study of the fifth and sixth Cantos of Scott's "Marmion." The second year men read Shakespeare's "Julius Cæsar," and a part of "King Richard the Second," and committed to memory the best passages in each. They also devoted two hours a week to the discussion of such questions as are usually considered under the head of Political Economy—land, labor, capital, the production and distribution of wealth, strikes, lock-outs, etc.

Department 5.—Mathematics and Book-keeping.

The work under this head, as I said once before, presents certain difficulties, which are likely to remain for some time to come. First of all, we cannot devote much time to the department; and in the next place, most of our students have only a very imperfect knowledge of the elementary principles of Mathematics, when they come to us. Consequently, we have not as yet undertaken anything beyond Arithmetic, Mensuration, elementary Mechanics, and the less difficult operations in Levelling and Surveying. Even in these few branches, we find it necessary to lay most stress on what is likely to have frequent application in the ordinary business of a farming community. The Book-keeping also is of a special kind. It might be called farm Book-keeping—farm, garden, field, and dairy accounts.

The work of last winter differed very little from that of the winter before; hence I shall not spend time in describing it, but simply refer to the examination papers on Arithmetic, Statics, and Book-keeping in Appendix 3, and to the Class-Lists in Appendix 4, for evidence of the work done in this department.

Course of Apprenticeship.

Last year, as usual, our students were sent regularly to work in the outside departments. There were no exceptions, nor any choice of employment. All were placed on the same level, and had to take their share of such work as ordinary Canadian farmers have to do; and, owing to this fact, we are pleased to be in a position to say that no one has yet been able to point to a single instance of a farmer's son having acquired a dislike to farm work by attendance at the Ontario Agricultural College; and this we look upon as a matter of very considerable importance, in view of the fact that the weak point in a general system of theoretical instruction, such as we have in this Province, is its tendency to unfit a large number of young men for making a living at any occupation that requires them to soil their hands in the performance of manual labour.

So far as we can judge, our system of combining out-door work with study is productive of good results; for not only are city boys prepared for farming, but farmers' sons are educated without losing their taste for farm work, and are trained up in the belief that manual labor is not at all incompatible with intelligence, refinement, and respectability—that a farmer may be a well-informed gentleman of the highest type.

1.—Farm and Live Stock Departments.

In January, February and March there is not much work to do on the farm; and if we had to rely entirely upon that department for employment for the students, we should be involved in serious difficulty. But live stock of all kinds requires more attention in winter than at any other season of the year. Cattle, sheep, pigs, and horses, all need special care in cold weather. Consequently, our young men devote a good deal of time to that department during the Winter Term, and have ample opportunity for getting a thoroughly practical knowledge of Professor Brown's methods of rearing, feeding, and fattening all the kinds, grades, and ages of animals kept on our farm.

Last winter, in addition to the regular work of looking after the different breeds of cattle, sheep, and pigs, there was an extensive series of experiments in cattle and sheep feeding, which furnished a good deal of very instructive work to all who were interested enough to take part in it.

2.—Mechanical Department.

The work in this department furnished a variety of useful employment, as in former years. The students were instructed in the use of such tools as are required in plain carpenter work, and were regularly employed in repairing implements, barns, and college buildings; in making gates, waggon-tongues, &c.; and in doing a variety of odd jobs such as receive constant attention on every well-managed farm.

As this department comes under the report of the Farm Manager, it does not devolve on me to go into any of the details of the year's operations; but I may observe in passing that there is no department of the Institution in which the students take a greater interest, and none in which they are more profitably employed during the winter months.

3.—Horticultural Department.

As already intimated, this department is rapidly growing in extent and importance. The theoretical instruction in Botany, Entomology, and Horticulture is given by Professor McMurrich; and the practical work of the department is managed by Mr. James Forsyth, our gardener, assisted by a special committee of the Fruit Growers' Association.

The department now embraces a large lawn and arboretum, three green-houses, a four-acre kitchen-garden, a sixteen-acre orchard, a vinery, and several experimental clumps of young forest trees.

During the past year, a great deal of work has been done in laying out, grading, and planting the lawn, according to the accompanying plan, drawn by Mr. Miller, of Fairmount Park, Philadelphia. The surface soil was thoroughly pulverized; new roads were made; some of the ground was re-seeded; and a portion of it re-planted according

to the plan recommended by Mr. Miller: so that the surroundings of the College hav undergone a complete transformation; and no one will deny that the appearance of thing is very much improved. See accompanying plans of grounds and proposed new green-houses, &c.

In the early part of last winter, the second year students were sent to the gardener for instruction in grafting, budding, layering, etc.; about the middle of February, they commenced a special examination and study of our green-house plants; and, at the end of March, most of them passed a creditable examination on the paper headed Horticulture, in the first part of Appendix 3.

Special Live Stock Class.

In the fall of 1882, we organized a Special Class for the benefit of some young men who did not wish to take the regular course; but were anxious to devote a few months to the study of Live Stock and Veterinary Science.

The members of this class, not to exceed twenty in number, were to spend the half of each day in handling and looking after cattle, sheep, pigs, and horses, and the remainder of the time in studying lectures and books which treat of these animals in health and disease.

By this arrangement over twenty young men were employed in looking after animals which, under other circumstances, would have been attended to by six or seven of the regular students. Consequently, the work of the specialists, being confined to the one department, was really for their own benefit, rather than for the performance of remunerative labor; and, for that reason, the Institution did not pay them for their work.

The class began on the 1st October, and was to continue till the end of March. As might be expected in any new departure, certain difficulties were encountered from time to time; but none of them proved at all serious, except one: that was the temptation to idleness, which arose from the fact that the time of the class was not fully occupied with lectures and recitations. They were placed on their honour, and directed to spend a few hours every day in reading text-books on Live Stock and Veterinary Science. Some did as they were expected to do, and others might be said to have wasted the greater part of the time that was set apart for reading. The former were orderly and well-behaved; the latter were more or less troublesome.

Students who neglect their work during the term, generally find some excuse for shirking examinations at the end; and the idlers amongst our Specials last year were no exception to the rule. Sixteen out of the twenty left just before the Easter Examinations; and the effect of their leaving was, to say the least, very undesirable. It created amongst the regular students a restlessness which was difficult to control, and ultimately resulted in the permature departure of several who should, and under other circumstances, would have remained to the end of the term.

The class was an experiment; and, while the results were not altogether satisfactory, we are giving it another trial this winter, and are endeavoring to guard carefully against the difficulties which arose last year. So far, I have been much pleased with the work and conduct of the new class.

Easter Examinations.

The Easter Examinations were, as usual, on the class-room work of the Winter Session (1st October to the 31st March). They commenced on the 19th, and ended on the 28th of March. The questions set in the different subjects will be found in the first part of Appendix 3. Most of them are difficult enough to differentiate the best students, while they give every honest worker a fair chance to pass. The answers were carefully valued, and the candidates arranged in three classes, according to the percentage of marks obtained by each.

All below 33 per cent					"plucked."
33 per cent.	to	49	per	cent., inclusive	3rd class or passed.
50 "		74	"	"	2nd class honours.
75 "		100	"	"	1st class honours.

A complete record of all the candidates will be found in the Class-Lists (Appendix 4); not only those who passed or won honours, but also those who failed. A fair proportion got first-class honours in one or more subjects, and a few gained the high rank of first-class men in one or more of the five departments, as follows :—

FIRST CLASS MEN IN THE DEPARTMENTS AT EASTER, 1883.

Departments.		First Year Men.	Departments.		Second Year Men.
I.	Agriculture and Live Stock.	None.	I.	Agriculture and Live Stock.	None.
II.	Natural Science.	1. Slater, H. 2. Lehmann, A. 3. Macdonald, W. A.	II.	Natural Science.	1. Torrance, W. J. 2. Robertson, W. 3. Fotheringham, W. Perry, D. E. 5. Jeffs, H. B. 6. Willis, W. B.
III.	Veterinary Science.	1. Carpenter, P. A. 2. Lehmann, A. 3. Hubbard, W. W. 4. Saxton, E. A. 5. Powys, P. C.	III.	Veterinary Science.	None.
IV.	English Literature and Composition.	1. Slater, H. 2. Powys, P. C. 3. Tucker, H. V. 4. Carpenter, P. A. Macdonald, W. C.	IV.	English Literature and Political Economy.	None.
V.	Mathematics and Book-Keeping.	1. Westlake, G. 2. Sharman, H. B. 3. Lehmann, A. 4. Carpenter, P. A. 5. Black, C. H. 6. Little, W. 7. Macdonald, W. A. 8. Ballantyne, A. W. McGregor, H. 10. Wark, A. E.	V.	Mathematics.	1. Willis, W. B. 2. Robertson, W. 3. Torrance, W. J. 4. Fotheringham, W.

As there are several blanks in these lists, it is perhaps right that I should add a word of explanation. Some may wonder how it is that, in the first year, there are no first-class men in Agriculture and Live Stock ; and, in the second year, none in Agriculture, Veterinary Science, or English Literature and Political Economy.

In the first place, it may be observed that no one is ranked first-class in any department, unless he obtains 75 per cent. of the total number of marks allotted to the subjects in that department. If a candidate falls in any degree below this standard he is ranked as a second-class man. In the next place, although theory and practice go hand in hand with us, it takes some time to become thoroughly proficient in the practice. Young men may, even in six months, acquire a good deal of theoretical knowledge about cattle, sheep, horses, and English Literature ; but they cannot, in so short a time, become proficient in judging animals, writing English, or solving original problems in Political

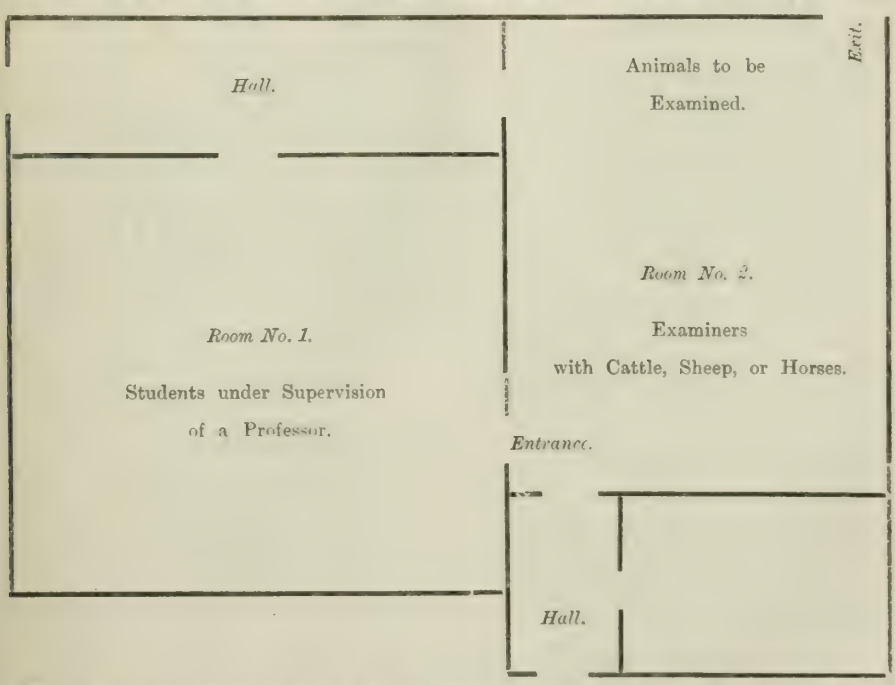
Economy. So it was with our students last Easter. Some of them were marked A1 in the theory; but, nevertheless, they failed to get the aggregate of marks necessary for a first-class rank in Agriculture, Veterinary Science, and English Literature: and a glance at the Class-Lists in Appendix 4, will show that the practical examinations were the cause of the failure in almost every instance.

Oral Examination of Live Stock.

In a previous report I called attention to the fact that we had instituted a practical examination of cattle, sheep, and horses, to be held twice a year—at Easter and Midsummer. We did so because we had discovered that it was quite possible for a young man to study books and copy notes of lectures, till he could write very sensible answers to questions on any class of animals, and, after all, be utterly unable to describe or judge intelligently any particular specimen, according to the standard which he found in his books or notes. The result has been all that we could have wished. The anticipation of these half-yearly examinations has led the students to go more frequently into the yards and stables, with note books in hand, to handle, judge, and compare various specimens of the several breeds of animals kept by the Institution.

In speaking more particularly of last Easter, I may say that the animals to be examined were taken into the Veterinary Classroom. The students were admitted one at a time; and when each had spent the allotted number of minutes in examining the animals and answering questions, he passed out, and another from an adjoining classroom took his place. The following diagram shows the relative position of the rooms used, and indicates more clearly than words how the examination was conducted:—

Diagram Showing Method of Conducting Practical Examinations of Cattle, Sheep, and Horses.



The class to be examined each day was sent early in the morning to room No. 1 in charge of a Professor; and at the hour for commencing the examination, the first student on the list went from room No. 1 to room No. 2, to meet the examiners. When his time was up, he passed out of the building. Another from No. 1 took his place; and so on, till the whole list was gone through.

HONOUR CERTIFICATES,

Granted on the Results of the Easter Examinations, 1883.

FIRST YEAR.

Agriculture—

Natural Science—

1. Slater, H.....Taunton, England.
2. Lehmann, A.....Orillia (Simcoe), Ont.
3. Macdonald, W. A.....Stratford (Perth), Ont

Veterinary Science—

1. Carpenter, P. A.....Collingwood (Simcoe), Ont.
2. Lehmann, A.....Orillia (Simcoe), Ont.
3. Hubbard, W. W.....Burton, New Brunswick.
4. Saxton, E. A.....Nantwich, England.
5. Powys, P. C.....Fredericton, New Brunswick.

English Literature and Composition—

1. Slater H.....Taunton, England.
2. Powys, P. C.....Fredericton, New Brunswick.
3. Tucker, H. V.....Toronto (York), Ont.
4. { Carpenter, P. A.....Collingwood (Simcoe), Ont.
   { Macdonald, W. A.....Stratford (Perth), Ont.

Mathematics and Bookkeeping—

1. Westlake, G.....Yarmouth Centre (Elgin), Ont.
2. Sharman, H. B.....Stratford (Perth), Ont.
3. Lehmann, A.....Orillia (Simcoe), Ont.
4. Carpenter, P. A.....Collingwood (Simcoe), Ont.
5. Black, C. H.....Amherst (Nova Scotia), Ont.
6. Little, W.....Killyleagh (Simcoe), Ont.
7. Macdonald, W. A.....Stratford (Perth), Ont.
8. { Ballantyne, A. W.....Stratford (Perth), Ont.
   { McGregor, H.....Colborne (Northumberland), Ont.
10. Wark, A. E.....Wanstead (Lambton), Ont.

SECOND YEAR.

Agriculture and Live Stock—

Natural Science—

1. Torrance, W. J.....Ottawa (Carleton), Ont.
2. Robertson, W.....Wanstead (Lambton), Ont.
3. { Fotheringham, W.....St. Mary's (Perth), Ont.
   { Perry, D. E.....Ottawa (Carleton), Ont.
5. Jeffs, H. B.....Bondhead (Simcoe), Ont.
6. Willis, W. B.....Whitby (Ontario), Ont.

Veterinary Science—

English Literature and Composition—

Mathematics and Bookkeeping—

1. Willis, W. B.....Whitby (Ontario), Ont.
2. Robertson, W.....Wanstead (Lambton), Ont.
3. Torrance, W. J.....Ottawa (Carleton), Ont.
4. Fotheringham, W.....St. Mary's (Perth), Ont.

Spring Term.

(16th April to 30th June).

All specialists, and generally some others, leave at Easter; hence we have been accustomed to hold two entrance examinations in the year, one on the 1st of October, and the other on the 16th of April. The number admitted in April last year was 18. They were examined on the 17th and 18th; and lectures commenced on the 19th.

Work in Outside Departments.

As the Spring Term affords special opportunities for practice in the outside departments, the class-room work did not receive quite so much attention as during the Winter Term. Every one had to attend lectures three hours a day as usual; but a little less time was occupied in study than during the winter months. From four and a half to five hours a day were devoted to practical work outside, a part of which was spent with the instructor, and the balance with the foremen of the several departments. By the instructor, I mean one of our men who spends most of his time in teaching the students how to perform such operations as they require to understand before taking charge of farms on their own responsibility: such as harnessing and driving horses, ploughing, sowing, harrowing, rolling, mowing with the scythe, driving a mower, and such like. The young men are sent to him in rotation, according to our knowledge of what they require; and while under his instruction they get no wages. Hence they are generally anxious to learn as quickly as possible, so that they may be in a position to claim the promised pay for their work.

Class-room Work.

While particular prominence was given to practical work outside, the theoretical work inside was by no means neglected. In the department of Agriculture the cultivation of the various crops was taken up; seeds were examined and judged; the different modes of sowing discussed and exemplified; the principles underlying rotation, and the rotations suitable to different soils, climates, and circumstances were explained; also the improvement of land by ordinary cultivation, subsoiling, fallowing, manuring, and laying down to grass. At the same time, under the head of Practical and Analytical Chemistry, the second year men were employed from three to four hours a week in the laboratory, examining and testing waters, soils, foods, manures, &c., so far as our limited appliances would allow. In that way they were led to see the practical value of what they had already learned in Inorganic, Organic, and Agricultural Chemistry. They had opportunities for putting their knowledge to a practical test. Hence most of them entered cheerfully and heartily into the work. In Systematic and Economic Botany they received lectures on the general classification of plants, and studied more particularly those orders which contain the most important agricultural and economic plants—cereals, grasses, roots, and plants used in the manufacture of fabrics, oils, medicines, and other articles of commerce. At the same time the first year students were attending lectures on Geology and Botany. In the former they learned something of the formation, composition, and character of the soils found in the country; in the latter, they studied the plant in relation to the soil and the atmosphere—its form, food, functions, and diseases, giving special attention to hybridization, the different modes of propagation, and such diseases as smut, rust, mildew, etc. The lectures of the class-room were illustrated and applied to some extent by the gardener while the students were at work with him in the greenhouses, gardens, and lawns. In the departments of Veterinary Science, English and Mathematics, the work was carried on as during the Winter Term. The first year students had twenty-four lectures on the preparation, action and doses of about fifty kinds of medicine commonly used in veterinary practice; studied Washington Irving's "Sketch Book"; wrote impromptu compositions; began the study of Mensuration; and continued that of Book-keeping from the previous term. During the same time, the second year

men had lectures on Veterinary Science, twenty-five or thirty important medicines, and the therapeutics of the veterinary art; read critically and committed to memory Milton's "L'Allegro," and "Il Penseroso;" gave some attention to farm Book-keeping; and went twice a week into the fields with a master to apply, as far as possible, what had previously been taught them under the heads of Levelling, Draining, and Elementary Surveying.

Examiners and Examinations.

Hitherto we have found difficulty in getting suitable persons to act as examiners in Agriculture and Live Stock. Many have the knowledge, but very few have the experience necessary for that kind of work. Some have both the knowledge and the experience, but cannot spare the time. In order, therefore, to make our honours and diplomas worth as much as possible to the recepients, I think it would be advisable, before long, to ask for a small annual vote to pay examiners in all the departments; we should then find less difficulty in getting competent men to undertake the work; the students would not confine themselves so closely to the lecture-room notes—they would read more extensively; and, I have no doubt, it would have an excellent effect on both professors and students.

Last Easter the examinations were all conducted by the professors of the College, except Practical Cattle, Practical Sheep, English Literature, and Political Economy; and at midsummer the only subject in which we had an outside examiner was English Literature.

The List of Examiners is as Follows:—

Wm. Brown, Esq., College.....Agriculture and Live Stock.
John Hobson, Esq., Mosboro', (Wellington).Handling and Judging Cattle and Sheep.
Charles Drury, M.P.P., Crown Hill,(Simcoe).Handling and Judging Cattle and Sheep.
R. B. Hare, Ph.Dr., College .....Chemistry, Meteorology, and Geology.
J. Playfair McMurrich, M.A., College .....Biology, Horticulture and English Literature.
F. Grenside, V.S. .....Veterinary Science.
S. C. Smoke, M.A., Toronto .....English Literature.
Wm. Douglas, B.A., Toronto .....Political Economy.
E. L. Hunt, Esq., College.....Mathematics, Bookkeeping, and English Literature.

These gentlemen prepared the questions, examined the answers, and ranked the candidates according to the standard laid down on a previous page. The work was satisfactorily done; and I beg to return my most sincere thanks to all, but especially to those outside of our own staff, *i.e.*, to Messrs. Drury, Hobson, Smoke, and Douglas for their generous and efficient assistance in the departments which they represent.

The results of the Midsummer Examinations are given fully in the second part of Appendix 4; from which it will be seen that a few in each year gained the rank of first-class men in one or more of the departments, and received honour certificates as follows:—

HONOUR CERTIFICATES.

Midsummer Examinations, 1883.

First Year.

Agriculture—

1. Macdonald, W. A.....Stratford (Perth), Ont.
2. Carpenter, P. A.....Collingwood (Simcoe), Ont
3. Ballantyne, A. W.....Stratford (Perth), Ont.

Natural Science—

1. Carpenter, P. A.....Collingwood (Simcoe), Ont.
2. Lehmann, A.....Orillia (Simcoe), Ont.
3. Macdonald, W. A.....Stratford (Perth), Ont.
4. Wark, A. E.....Wanstead (Lambton), Ont.
5. McKay, J. B.....Stellarton, Nova Scotia.
6. Ballantyne, A. W.....Stratford (Perth), Ont.

Veterinary Science—

1. Miller, J. P.....Norwich, England.
2. Carpenter, P. A.....Collingwood (Simcoe), Ont.
3. Hubbard, W. W.....Burton, New Brunswick.
4. Wark, A. E.....Wanstead (Lambton), Ont.
5. Macdonald, W. A.....Stratford (Perth), Ont.
6. Butler, G. C.....London, England.
7. Ballantyne, A. W.....Stratford (Perth), Ont.
8. Shaw, A. G.....Wolverhampton, England.
9. Black, P. C.....Windsor, Nova Scotia.

English Literature and Composition—

1. Black, P. C.....Windsor, Nova Scotia.
2. Miller, J. P.....Norwich, England.
3. Carpenter, P. A.....Collingwood (Simcoe), Ont.
4. Macdonald, W. A.....Stratford (Perth), Ont.

Mathematics—

1. Wark, A. E.....Wanstead (Lambton), Ont.
2. Little, W.....Killyleagh (Simcoe), Ont.
3. Sharman, H. B.....Stratford (Perth), Ont.
4. Carpenter, P. A.....Collingwood (Simcoe), Ont.
5. McKay, J. B.....Stellarton, Nova Scotia.
6. Ballantyne, A. W.....Stratford (Perth), Ont.
7. Wroughton, T.....India.
8. Macdonald, W. A.....Stratford (Perth), Ont.

Second Year.

Agriculture and Live Stock—

1. Robertson, W.....Wanstead (Lambton), Ont.
2. { Willis, W. B.....Whitby (Ontario), Ont.
   { Jeffs, H. B.....Bond Head (Simcoe), Ont.

Natural Science—

1. Slater, H.....Taunton, England.
2. Robertson, W.....Wanstead (Lambton), Ont.
3. Jeffs, H. B.....Bond Head (Simcoe), Ont.
4. Willis, W. B.....Whitby (Ontario), Ont.

Veterinary Science—

1. Robertson, W.....Wanstead (Lambton), Ont.
2. Fotheringham, W.....St. Mary's (Perth), Ont.
3. Jeffs, H. B.....Bond Head (Simcoe), Ont.
4. Slater, H.....Taunton, England.

English Literature—

1. Robertson, W.....Wanstead (Lambton), Ont.
2. Slater, H.....Taunton, England.
3. Fotheringham, W.....St. Mary's (Perth), Ont.
4. Willis, W. B.....Whitby (Ontario), Ont.

Mathematics—

1. Willis, W. B.....Whitby (Ontario), Ont.
2. Jeffs, H. B.....Bond Head (Simcoe), Ont.

Visitors.

It is, I believe, still correct to say that the Ontario Agricultural College and Experimental Farm has a larger number of visitors, from home and abroad, than any other public institution in the country—visitors of every class and calling, but especially farmers. The only agricultural college in the Province; the only institution in the British Dominions that has systematically attempted to combine study and manual labour; an institution that has been keenly criticised and soundly abused—all this has given us more or less notoriety, and has excited a curiosity to see and know exactly what we are doing.

Last year we had not only the usual number of daily visitors, but several large excursions of farmers in the month of June, from Brant, Oxford, Wentworth, Huron, Bruce, Grey, Simcoe, York, and Peel, with smaller companies from Wellington, Halton, and other places. Everything passed off pleasantly. Short addresses were delivered by leading excursionists, and resolutions passed at the close of each day's proceedings.

In Camp at London.

By the kindness of Lieutenant-Colonel Macdonald, commander of the First Provisional Brigade of Field Artillery, we have had for the last three years the very efficient and valuable services of Adjutant Clark, as instructor in artillery, rifle drill, and gymnastics. Adjutant Clark is undoubtedly one of the best instructors in the Dominion; and he has spared no pains to do the college work efficiently, and in such a way as to interest the students, and meet the wishes of the officers as regards study, work, and discipline; without a gymnasium, or a suitable room to drill in, he has given our young men not only the ordinary military drill, but also a great variety of valuable exercises with bar-bells, parallel bars, Indian clubs, &c.; all of which has a direct bearing on the much neglected, but all important subject of physical education.

Then, a number of the students, being members of the Ontario Field Battery, were called out to camp on the 20th June, but could not be spared from the College till the 23rd. Twenty-five of them went into camp at London on the 24th, and returned to the College on the 3rd July, just in time for the closing exercises of the session.

CLOSING EXERCISES.

Granting of Diplomas; Presentation of Medals and Prizes.

The usual public exercises at the close of the year's lectures and examinations took place on the 3rd July. A number of visitors from Guelph, and elsewhere, came to show their interest in the Institution, and to witness the presentation of the diplomas, medals, and prizes. After a short address by the President of the College, the Hon. James Young, Commissioner of Agriculture, granted diplomas to the following young gentlemen, and, before doing so, alluded to the fact that the College had decided at the outset not to cheapen its diplomas by granting them to any but those who reached the required standard in every department of study and work prescribed in the curriculum. Consequently, only nine out of a class of twenty-four were presented to receive at his hands the parchment admitting them to the status of associates of the Ontario Agricultural College.

Associates.—Fotheringham, W.; Garland, C. S.; Jeffs, H. B.; McPherson, D.; Perry, D. E.; Robertson, W.; Schwartz, J. A.; Torrance, W. J.; Willis, W. B.

The Gold Medal was presented to W. Robertson, of Wanstead, County of Lambton, by the Hon. James Young; the First Silver Medal to W. B. Willis, of Whitby, by James Innes, M.P.; and the Second Silver Medal to Wm. Fotheringham, of St. Mary's, by

James Laidlaw, M.P.P. The prizes and honour certificates were presented by members of the Faculty, clergymen, and other visitors; after which the students and a number of their friends met in the college dining-hall for tea.

Associates of the College.

1881.

Ballantyne, W. W	Stratford, Ont.
Dickinson, C. S	England.
Grindley, A. W	Montreal.
Motherwell, W. R	County of Lanark.
Phin, R. J	Hespeler, County of Waterloo.
Phin, W. E	" "
Pope, Herbert	County of Grey, Ont.
Ross, James G	Montreal.
Robins, W. P	"

1882.

Blanchard, M. G	Windsor, Nova Scotia.
Charlton, G. H	St. George (Brant), Ont.
Chase, Oscar	Cornwallis, Nova Scotia.
Dawson, J. J	South Zorra (Oxford), Ont.
Dennis, James	Weston (York), Ont.
Elworthy, R. H	Jamaica.
Fotheringham, James	St. Mary's (Perth), Ont.
Hallesy, Frederick	Merthyr Tydvil, Wales.
Horne, W. H	North Keppel (Grey), Ont.
Howitt, Wm	Guelph (Wellington), Ont.
Landsborough, John	Clinton (Huron), Ont.
Mahony, E. C	Hamilton (Wentworth), Ont.
Nicol, George	Cataraqui (Frontenac), Ont.
Ramsay, R. A	Eden Mills (Halton), Ont.
Shuttleworth, Arthur	Mt. Albert (York), Ont.
Silverthorne, Newman	Sommerville (Peel), Ont.
Stover, J. W	Norwich (Oxford), Ont.
Wettlaufer, Frederick	Tavistock (Oxford), Ont.
White, C. D	Hereford, England.

1883.

Fotheringham, W	St. Mary's (Perth), Ont.
Garland, C. S	Montreal.
Jeffs, H. B	Bond Head (Simcoe), Ont.
McPherson, D	Glanworth (Middlesex), Ont.
Perry, D. E	Ottawa (Carleton), Ont.
Robertson, W	Wanstead (Lambton), Ont.
Schwartz, J. A	Quebec.
Torrance, W. J	Ottawa (Carleton), Ont.
Willis, W. B	Whitby (Ontario), Ont.

Prizes Awarded on the Results of the Easter Examinations.

First Year.

Agriculture and Live Stock—
1st. Little, W.
2nd. Ballantyne, A. W.

Natural Science—
1st. Slater, H.
2nd. Lehmann, A.

Veterinary Science—
1st. Carpenter, P. A.
2nd. Lehmann, A.

English Literature and Composition—
1st. Slater, H.
2nd. Powys, P. C.

Mathematics and Bookkeeping—
1st. Lehmann, A.
2nd. Westlake, G.

General Proficiency—
1st. Macdonald, W. A.
2nd. Lehmann, A.
3rd. Carpenter, P. A.

Second Year.

Agriculture and Live Stock—
1st. Jeffs, H. B.
2nd. Torrance, W. J.

Natural Science—
1st. Torrance, W. J.
2nd. Robertson, W.

Veterinary Science—
1st. Fotheringham, W.
2nd. Torrance, W. J.

Eng. Lit. and Political Economy—
1st. Fotheringham, W.
2nd. Willis, W. B.

Mathematics and Bookkeeping—
1st. Willis, W. B.
2nd. Robertson, W.

General Proficiency—
1st. Torrance, W. J.
2nd. Robertson, W.
3rd. Fotheringham, W.

Medals.

The competition for the College Medals is—

(1) By written examinations at Easter on the class-room work of the Fall and Winter Terms.

(2) By written examinations at the end of June on the class-room work of the Spring Term.

(3) By practical examinations at the above dates on cattle, sheep, pigs, horses, and the various operations taught or performed on the farm, in the garden, or in the carpenter shop.

The minimum standard for the Gold Medal is 50 per cent. of the marks in each subject, and an aggregate of 75 per cent. of the total number of marks in all the subjects; for the Silver Medals, 50 per cent. in each subject, and an aggregate of 67 per cent. in all the subjects.

Last year the competition was keen, as usual; and the results, as regards the first three or four on the list, may be stated as follows:—

(1) Written Examinations at Easter.	(2) Written Examinations at Midsummer.	(3) Practical Examinations, Midsummer.
1. Robertson, W.	1. Robertson.	1. Robertson.
2. Fotheringham, W.	2. Willis.	2. Jeffs.
3. Willis, W. B.	3. Jeffs.	3. Willis.
4. Jeffs, H. B.	4. Fotheringham.	4. Fotheringham.

General Proficiency.

1. Robertson, W. (Gold Medallist).....Wanstead, Lambton, Ont.
2. Willis, W. B. (First Silver Medallist).....Whitby, Ontario, Ont.
3. Fotheringham, W. (Second Silver Medallist).St. Mary's, Perth, Ont.
4. Jeffs, H. B.....Bond Head, Simcoe, Ont.

Medallists.

Eight medals have hitherto been awarded, two by His Excellency the Marquis of Lorne, and six by the College. The winners have all been non-drinkers and non-smokers. Six of them are farmers' sons, and all but one from the Province of Ontario.

1880.

J. L. Webster, Nova Scotia, banker's son.. Winner of Governor General's Medal.

1881.

R. J. Phin, Hespeler, Ont., farmer's son.. Winner of Governor General's Medal.

1882.

F. Wettlaufer, County of Oxford, Ont., farmer's son....Gold Medallist.
A. Shuttleworth, County of York, Ont., farmer's son....First Silver Medallist.
R. A. Ramsay, County of Halton, Ont., farmer's son....Second Silver Medallist.

1883.

W. Robertson, County of Lambton, Ont., farmer's son....Gold Medallist.
W. B. Willis, County of Ontario, Ont., farmer's son....First Silver Medallist.
W. Fotheringham, County of Perth, Ont., clergyman's son.Second Silver Medallist.

Summer Term.

(1st July to 31st August.)

At the close of the Spring Term (30th June), when the year's lectures were ended, most of the farmers' sons went home for haying and harvest, and some of the other students hired out with farmers for the summer months; so that only thirty remained with us during the Summer Term (July and August). These worked nine and a half hours a day, giving more or less attention to all the departments, but spending the greater part of their time where it was most needed, *i.e.*, on the farm. I shall not attempt to give a detailed account of the routine in each department, but simply say that the young men received more or less instruction in the fields, the yards, the gardens, and the shop. They spent a portion of their time in a special class for the purpose of learning how to dig, plough, harrow, sow, shear sheep, mow, cradle, drive a reaper, bind, shock, &c.; and did all there was to do in the summer months, on a four hundred-acre grain and stock farm, and in the management of a large vegetable garden, flower garden, orchard, and lawn.

Fall Term.

Commencement of a New Scholastic Year—1st October, 1883.

Forty-seven old students returned at the beginning of the Fall Term, and sixty-two new ones were admitted, making a total of 109. Twenty-three had to pass our Matriculation Examination, and thirty-nine were admitted on presentation of certificates. The names and addresses will be found in the second part of Appendix 1 ; and the following lists contain the names of the counties, countries, and religious denominations which they represent :—

Counties, etc.	No. of Students.	Counties, etc.	No. of Students.
Brant	1	Middlesex	3
Bruce	2	Montreal	5
Carleton	4	New Brunswick	3
Durham	2	Norfolk	1
Elgin	1	Northumberland	5
England	10	Nova Scotia	5
Frontenac	1	Oxford	1
Glengarry	1	Perth	5
Grey	2	Prince Edward	1
Hastings	1	Prince Edward Island	2
Huron	1	Peterboro	2
India	1	Province of Quebec	1
Ireland	1	Simcoe	9
Kent	2	Scotland	2
Lambton	1	Toronto	10
Lanark	1	Victoria	1
Leeds	1	Wales	1
Lincoln	1	Wellington	6
Manitoba	3	Wentworth	2
Massachusetts, U. S.	1	York	3

Total number in attendance during Fall Term, 1883.....109
Number of Counties in Ontar represented..... 27

Religious Denominations of Students in Attendance During Fall Term.

Episcopalians	47
Presbyterians	29
Methodists	20
Congregationalists	4
Baptists	3
Roman Catholics	3
Plymouth Brethren	1
Lutherans	1
Unitarians	1
Total	109

Ages of Students.

Candidates for admission must be at least sixteen years of age. The ages of those now in attendance range from 16 to 32, as follows :

18	at the age of	16	years.
19	"	17	"
30	"	18	"
13	"	19	"
14	"	20	"
8	"	21	"
3	"	22	"
1	"	23	"
1	"	24	"
1	"	25	"
1	"	32	"

Average Age.. ....18½ years.

Classroom Work.

The time tables in Appendix 2 indicate the subjects which are taken up in the Fall Term, and the number of hours allotted to each. Lectures commenced on Wednesday, the 3rd of October, and continued without interruption till 19th December.

Regular Students.

The first-year students received three lectures a week on the characteristic points and peculiarities of the different breeds of cattle ; had a full course of lectures with experiments on Chemical Physics and Inorganic Chemistry ; devoted an hour and a-half a week to Human Physiology ; and spent some time in studying the Anatomy and Physiology of the Horse. Under the head of English and Mathematics, they read a portion of Washington Irving's "Sketch Book," wrote compositions once a week, and reviewed certain portions of Arithmetic, with special reference to the requirements of farming in Canada.

The attention of the second-year men was directed to such subjects as stock-breeding, farm management, and the experimental plots ; the selection of animals for beef ; the housing, feeding, and fattening of the same ; the comparative values of pastures and green fodder ; results from the different kinds of seed, soil, and manures ; and the previous season's experiments with wheat, oats and grasses. They had one lecture a week on Meteorology, and a full course on Agricultural Chemistry—the composition of different plants in relation to the soils on which they grow ; the preservation and renovation of soils, the chemical composition and value of different manures, the superphosphates, double silicates, and other substances which furnish plant food. They spent two hours a week at lectures on Veterinary Pathology, and one in handling and examining horses for spavin, ring-bone, splint, founder, and other diseases, all under the eye and direction of our veterinary surgeon, Dr. Grenside ; they also read the greater part of Shakespeare's "Julius Cæsar," and devoted some time to the study of statics and drainage.

Special Students.

Fifteen students, who wished to confine their attention exclusively to Live Stock and Veterinary Science, chose the work of the Special Class described on a previous page. They attended the same lectures as the regular students with Professor Brown and Dr. Grenside ; had four special lectures a week on Agriculture and Veterinary Science, and spent the balance of their time in reading text-books on these subjects, and in looking after cattle, sheep, and pigs in pens, sheds, and stables.

In addition to this, I had almost forgotten to say, the Specials got a course of practical and, so far as I can learn, very popular lectures on stock, from P. J. Woods, our Farm Foreman ; which lectures were delivered sometimes in the classroom, but generally

in the stables with the cattle. Mr. Woods took the class from stall to stall examining, comparing, and judging the various animals from the standpoints of breeding, feeding, and immediate slaughter, and in that way made the young men thoroughly familiar with the strong and the weak points of all the animals kept on the farm. On certain days of the week also, Mr. Woods, being a practical butcher as well as stock-man, showed them how to cut up carcasses of pork, beef, and mutton for use in the College, pointing out the prime cuts and practically demonstrating how to prepare the different parts of a carcass for the table.

Fat Stock Show.

On the 13th and 14th December, the Guelph Fat Stock Club held its annual show in the city, and kindly arranged matters so that all our students were afforded special opportunities for examining, comparing, and judging the animals on exhibition. Every one had to take notes on the show as a whole, and on the best animals in each class, and write out a special report for Professor Brown. The work was heartily entered into and very much enjoyed by all the classes.

Terminal Examinations.

The examinations on the work of the Fall Term took place on the 19th and 20th December. The subjects were as follows :—

First Year—
- Live Stock,
- Inorganic Chemistry,
- Human Physiology,
- Veterinary Anatomy,
- English Literature,
- English Composition,
- Arithmetic,
- Bookkeeping.

Second Year—
- Agriculture,
- Live Stock,
- Agricultural Chemistry,
- Veterinary Pathology,
- English Literature,
- English Composition,
- Mechanics,
- Draining.

The questions were not difficult, because they were intended only to show who were making a right use of their time, and to prepare the candidates for a severer test at Easter. The results, as published in the daily papers, indicate very clearly that patient, plodding industry, here as elsewhere, almost invariably wins the race.

II.—BOARDING HOUSE AND COLLEGE BUILDINGS.

For the information of those who have not seen the College Buildings, I take the liberty of quoting, with slight alterations, a paragraph from my last report, as follows :—

College Buildings.

The College building, as shown on frontispiece, is a plain substantial structure, without much claim to architectural beauty. Like the Institution itself, it was built little by little without any very definite idea of the shape it might ultimately assume. When the Government first bought land and determined to establish an agricultural college, the

Architect drew plans for a building which would have suited the purpose exactly, but the cost seemed too great and the country was not prepared for it; consequently it was decided nine years ago to commence work with a few students in Mr. Stone's farmhouse. Additions and alterations were made from time to time as the number of students increased, till the result is a large and peculiarly arranged building, altogether different from what was originally intended—not what we would like—but affording considerable accommodation and serving the purpose fairly well.

In the building, as it now stands, there are one hundred and twenty-two rooms; three classrooms, a reading-room, a library, a room to be fitted up for a museum, a laboratory, three offices, a public reception-room, sixty-two students' dormitories, a large dining-hall, a servants' dining-room, a storeroom, pantry, kitchen, scullery, laundry, drying-room, eight bathrooms, nine bedrooms for servants, the messenger's-room, a parlour and bedroom for the Matron, a sitting-room and bedroom for the Assistant Resident Master, nine rooms in the left wing occupied as a dwelling-house by the President and his family, two rooms in the centre occupied by the Matron, an officers' dining-room, a spare room, three washrooms, an engine-room and a coal house.

Repairs Needed.

Some of the woodwork inside has become so dingy from seven or eight years' wear that there is need of an immediate expenditure of several hundred dollars for repairs. The old pine floors in three or four of the students' halls are almost worn out and should be at once replaced by new ones of well-seasoned oak or maple.

Repairs Done Last Year.

In June last Professor Brown moved out of the College into one of the new houses recently built on the lawn; and the rooms which he had previously occupied in the College were painted, papered, and overhauled generally by the Public Works Department, for the use of the President's family. At the same time about $200 of our maintenance appropriation was expended in painting and papering the Bursar's office and two rooms for the Matron in the front of the main building, and in graining and varnishing certain portions of the College halls, including twenty doors, fourteen windows, and a long stretch of wainscoting.

Boarding House.

In the Boarding-house nothing special has occurred during the past year. Things have moved along as usual. Our supplies are provided by contract; and, generally speaking, the quality of the articles furnished have been satisfactory. The Matron has superintended the work in the culinary department, and the Assistant Resident Master has taken charge of the students at meals and assisted me in looking after them in the halls and dormitories.

Daily Routine.

In regard to the surroundings of our students in the College, and the duties required of them, I may say that their bedrooms are furnished with beds, bedding, bureaus, mirrors, washstands, study-tables, and chairs. They sleep separately, two in a room, and in a few instances three. The daily routine during the Fall, Winter and Spring Terms, is as follows:—

All are required to rise at six to make their beds and put their rooms in order. At half-past six they go to breakfast; and at seven, or half-past seven, according to the season of the year, the students of one division are sent to work outside, and those of the other employ their time as they feel disposed, till eight o'clock. From eight to nine the latter are at drill or gymnastics, and from nine to twelve at lectures in the classroom. Both divisions return to the boarding-house and prepare for dinner at half-past twelve The bell rings at half-past one, and the division that was in at lectures in the forenoon,

goes out to work in the afternoon. The other division is free till two o'clock. From two till five it attends lectures ; and at five both divisions return again to the boarding-house to prepare for tea at half-past five. From tea time to seven o'clock, and in spring to eight o'clock, they generally rest or take exercise. From seven to nine, in fall and winter, and from eight to half-past nine in spring, they study in their rooms under the supervision of a master. At nine or half-past nine, according to the season of the year, they proceed to roll-call and evening prayers ; lights are put out at ten, and doors closed at half-past ten. Every student who is not under ban for some misdemeanour, is allowed out one evening in the week, till half-past ten. To some parents, perhaps, this will appear late ; but, as it takes not less than thirty minutes to come from the city to the College, any earlier hour would scarcely give sufficient time. When going out, each student leaves his name with the master in charge, and is required to report himself on his return, that we may know whether all are in or not before the doors are closed for the night.

Such is the routine in the boarding-house, and such are the duties required of the students therein, during nine months of the year. As the months of July and August are devoted entirely to work in the outside departments, the duties inside differ but little from those of an ordinary boarding-house on a large scale.

Discipline.

In the matter of discipline, the year 1883 was not at all exceptional. Of course, where there are so many young men boarding in the same building, it may be set down as a certainty that there will arise, now and then, cases which need to be dealt with promptly and vigorously, especially among the sons of the wealthier classes. As regards our own Institution, I think I am correct in saying that the uniform testimony of those who have come to us from the old country, is that the order maintained here is much better than they had been accustomed to in English schools and colleges ; and, considering the fact that I have only one master to assist me in looking after the students at all times, in the dining-room, halls, and dormitories, I think we may congratulate ourselves on the quiet which generally prevails in the College, and on the fact that so few difficulties have arisen.

When a new master comes, an effort is generally made by the more daring spirits, to test his mettle in some way or other, and occasionally by means that are very improper. To this development of youthful depravity is to be attributed the fracas of one evening last winter, which resulted in the kicking-in of the new master's door, the dismissal of five students, and the publication of a false and misleading article in one of the Toronto papers. In reference to which case, I have only to say, that if editors of papers had each a few months' experience in the management of a large boarding-house in connection with a College, they would wait to hear both sides before giving publicity to the statements of dismissed students or their sympathizers.

III.—THE BUSINESS DEPARTMENT.

Under this head there is a variety of work, for which the President and the Bursar are chiefly responsible—correspondence, books and accounts, general business, and the finances.

Correspondence.

Most of the correspondence falls to the lot of the President, and consists chiefly in sending out circulars, distributing reports, and answering inquiries about terms of admission, course of study, duties of students, cost of board and tuition, books used, books recommended, etc. Last year I distributed 1,800 copies of our last Annual Report, sent out about 1,000 circulars, and wrote, on an average, from five to six letters a day. Reports were sent to the leading Agricultural Colleges in Britain and the United States, to the subordinate granges in Ontario, and to all farmers and others who made application for copies.

Books and Accounts.

Our Bursar, Mr. A. T. Deacon, as financial agent of the Institution, is responsible for the work under this head. It is his duty to examine all accounts against the College and the Farm, to check them by invoices and requisitions, to charge each item under the proper heading, and make out separate statements for the College and the Farm once a month, submitting the former to the President and the latter to Farm Superintendent for approval, and then to forward both to the Treasury for payment. He receives and accounts for all moneys from the College, the Farm, and the Treasury Department, and pays all accounts that have been approved of by the President or the Farm Superintendent, and passed by the Auditor. He also keeps three sets of books :—

No. 1, showing the monthly expenditure under each head of the appropriation for the College and boarding-house.

No. 2, giving in detail the revenue and expenditure of the outside departments under the Farm Superintendent.

No. 3, showing the account of each student from the day he enters the College till he leaves it—tuition fees, board and washing, amounts allowed for labour, and cash balances paid the College for board and washing.

Printed sheets containing the names of all the students are furnished each foreman daily, who fills in the blanks with the description of the work done that day by the students in his department, the number of hours each has worked, and the estimated value of such work. These are filed daily in the office, and journalized weekly. At the end of the financial month these sums are posted to the credit side of each student's account in the ledger, whilst on the debit side is placed the cost of the board and washing for that month, as obtained from the books of the storeroom and the laundry. Two hundred and two such accounts were made out last year.

General Business.

In addition to his duties as bookkeeper, the Bursar has to provide supplies for the boarding-house and take charge of the storeroom. He is required to examine and weigh the meat and groceries as they are delivered, and see that the quality of all articles furnished by tender is up to the standard required by the terms of contract.

The President signs requisitions for all purchases, takes charge of the College buildings generally, and is responsible, not only for the management, but for the discipline of the inside departments, as regards both officers and students.

Finances.

The financial tables in Appendix 5 contain a brief statement of the College and Boarding-house accounts for the year 1883, and the estimated expenditure for 1884. Table No 1 shows the expenditure under the various heads: No. 2, the revenue from all sources ; No. 3, the College account with the Farm and the Garden, for 1883 ; and No. 4, the estimated expenditure in 1884.

The total expenditure in 1883, on the regular maintenance account, was $33,040 86, and on capital account, $719 76. It may be observed, however, that a number of items amounting to more than $600 under the head of maintenance might with more propriety have been charged to capital, had there been any vote for that purpose ; such, for instance, as a carriage shed, $75 ; plumber's tools, $160 ; iron tie-posts, $26 ; etc., etc.

A few facts regarding the revenue and expenditure of the College may be stated as follows—bearing in mind that the figures have no reference whatever to the Farm or any of the outside departments, except the amount paid by the College for farm salaries and student labour on the Farm, and the charges against the College for milk, flour, vegetables, etc., supplied by the Farm, as per table No. 3 :—

(1) College expenditure on maintenance account (including payments for student labour on Farm, &c.)		$33,040 86
College revenue from fees and board balances		7,242 47
Net expenditure (including payments for student labour, &c.)		$25,798 39
(2) Expenditure in 1883		$33,040 86
Voted for 1883		31,848 00
Over expended		$ 1,192 86

In this over-expenditure, the chief item is under the head of fuel, which exceeded the appropriation by $618 25 ; and the remainder is accounted for almost entirely by a number of items which should have been provided for by a vote on capital account ; but, as no such vote was taken and the purchases were necessary, they had to be made and charged to maintenance.

(3) Net expenditure in 1883 (including payments for student labour on Farm, &c.)		$25,798 39
Salaries of Foremen and part salaries of Superintendents of Farm and Garden	$3,000 00	
Paid for student labour on Farm and Garden	4,000 42	7,000 42
Net expenditure of College in 1883 (exclusive of payments for student labour on Farm, &c.)		$18,797 97

In table No. 4, Appendix 5, will be found the estimated expenditure for 1884, along side of the sums voted for various purposes in 1883. It is unnecessary for me to dwell on the items separately, any further than to request your favourable consideration of the claims urged for an increase in the salaries and wages of several professors and other officers of the institution. The increase asked in each case will be found in table 4, Appendix 5.

Last year I did my best to get a steward appointed to assist me in the boarding house, but failed to accomplish my purpose. I put down $500 for such a man as I require, but it was struck out ; so I have decided to let the matter drop for the present, in the hope that before long the Government may recognize the necessity for such an officer in the institution.

MISCELLANEOUS ITEMS.

Library.

A very important factor, in the education given at the College, is our Library of about 4,000 volumes, selected and added to from time to time, with reference to the present work and future wants of our students. We have not only a good representation of the best books which treat of the several branches taught in the Institution, but also a large number of volumes on history, biography, travels, poetry, and general literature, as well as the latest and best dictionaries and encyclopædias.

About a year ago, at the suggestion of the Hon. S. C. Wood, I commenced the work of making a catalogue for publication in our last annual report ; but finding it impossible to get it printed in time for presentation to the House, I decided to revise the list carefully and have it printed separately for the use of the students. In the work of revision, I was assisted by Mr. Rodger, a gentleman of leisure in Guelph, who kindly offered his services in arranging and checking the books, correcting proofs, &c. ; and I wish here to tender my most sincere thanks to that gentleman for his disinterested efforts to lighten my labors during the months of July and August. We worked together till the middle of September, at which time we had the pleasure of presenting the students the first printed catalogue of our Library.

Reading Room.

In our Reading Room, which may be described as large, commodious, and well-lighted, we have had forty-five papers and magazines on file during the past year—nine sent free by the publishers, thirty-two furnished by the College, and four by the Literary Society.

Papers and Magazines.

(*a*) *Sent Free by the Publishers.*

Journal of Commerce, Montreal
Journal of Agriculture, Montreal.
Weekly Herald, Stratford.
Advertiser, Elmira.
Christian Guardian, Toronto.
Canadian Entomologist, London.
Monthly Weather Review, Toronto.
Canada Presbyterian, Toronto.
Christian Herald and Signs of our Times, New York.

(*b*) *Furnished by the College.*

Daily Globe.
Daily Mail.
Weekly Globe.
Weekly Mail.
Guelph Mercury.
Guelph Herald.
Canadian Farmer and Grange Record, Welland.
Farmer's Advocate, London.
Rural Canadian, Toronto.
Grip, Toronto.
Canadian Lumberman, Peterboro'.
North British Agriculturist, Edinburgh.
Irish Farmer's Gazette, Dublin, Ireland.
Mark Lane Express, London, England.
Canadian Stock-Raiser's Journal, Hamilton.
National Live-Stock Journal, Chicago.
Live-Stock Journal and Fancier's Gazette, London, England.
Popular Science News and Boston Journal of Science.
Scientific American.
Scientific American Supplement.
Boston Journal of Chemistry.
American Agriculturist.
Cultivator and Country Gentleman.
City and Country.
Country Gentleman's Magazine,
Gardener's Monthly.
Veterinarian.
Veterinary Journal.
Aberdeen Free Press.
St. John Telegraph.
Good Words.
Sunday Magazine.
Quiver.

(*c*) *Furnished by the Literary Society.*

Contemporary Review.
Century Magazine.
Nineteenth Century.
Fortnightly Review.

Museum.

We have also a room set apart for a museum in the south end of the main building, not so large as we could wish, but fairly well adapted to the purpose. If the roof were raised, a gallery constructed, additional windows put in the east end, and the whole room re-floored, and re-fitted, we could soon make a very interesting and useful display of grain, seeds, and specimens in natural history, entomology, geology, meterology, etc.

Under several of these heads we have already a very fair collection; and a portion of it has been arranged and classified by the Professor of Biology, who acts as Curator of the Museum. For a list of the specimens now on hand, see appendix to Professor McMurrich's report in the third part of this volume.

Literary Society.

The Literary Society in connection with the College, was never more active, vigorous, and useful than at the present time. The members of this society meet every

Friday evening in one of the class-rooms, to practice reading, debating, and declamation. The discussions are often quite spirited; and the work done is, undoubtedly, a very valuable addition to the educational appliances of the Institution. In the performance of such work, the young men have an opportunity of testing their ability before they assume the responsibilities of life on the broader scale. They learn to speak in public, and gradually become acquainted with the rules of order according to which public meetings are conducted. Their wits are sharpened, their reasoning powers developed, and their manners improved. Last year the funds of the society were spent in the purchase of papers, magazines, reviews, and prizes for reading, essay-writing, and public speaking.

Changes in the Staff.

In the beginning of this report, I stated that no changes in the staff had taken place during the year 1883, forgetting to say that at the close of 1882, Dr. Nattress, who had been my Assistant Resident and Mathematical Master, resigned his position and went to Europe to complete his medical education. He was succeeded by E. L. Hunt, a third-year undergraduate of the University of Toronto, who is still with us.

There is no doubt that the frequent changing of masters or professors in any school or college is productive of bad results; and for that reason, I hope the Government of this Province may ere long judge it expedient to pay such salaries as will secure the longest possible tenure of office by the several members of our staff.

E. A. A. Grange, V.S., who was one of the first professors appointed to lecture in the Ontario Agricultural College, remained at his post for a little over seven years, but never succeeded in getting a higher salary than $600 per annum. He did his work well and faithfully, hoping that in the course of time his efforts would meet with something like adequate remuneration. In this, however, he was disappointed from time to time; and, not seeing any very good grounds to hope for more liberal treatment in the future, he at length resigned his position with us and went to Lansing, Michigan, where they where glad to get him to lecture in their Agricultural College for more than twice the salary that we paid him.

Dr. Grenside is our Professor of Veterinary Science at the present time; and I am pleased to say that he is giving entire satisfaction as a lecturer and practitioner; but he will not remain long with us for $600 a year. I have asked for an increase in his salary; and I sincerely hope the Government may judge it expedient to comply with my request so far as to prevent us from losing his services also.

Under New Auspices.

At the beginning of last year we were disappointed to hear that our old Chief, the Hon. S. C. Wood, under whose control and guidance we had worked so long, had decided to retire from public life and leave us in charge of some one else. After a few months' suspense, we were reassured by the very acceptable appointment of the Hon. James Young, who at once acquainted himself with all the departments of the Institution, and took a most earnest and active interest in everything pertaining to the College and the Farm. All seemed fair for another term of successful work, when we were again surprised by the unexpected and much regretted resignation of Mr. Young; and now, Sir, we have the honour to look to you for counsel and guidance, and we do so in the hope that we may be able to work in such a way as to secure your approval, and promote the best interests of the Ontario Agricultural College and Experimental Farm.

Wants and Recommendations.

As usual, our wants are numerous, but may be stated very briefly:—

(1) The renewal of worn-out floors in the College.
(2) A hot-water boiler in the College.
(3) Additions to our coal-houses.
(4) An ice-house.

(5) The removal of all our old barns and stables, and the erection of suitable farm buildings a little farther away from the College.

(6) A new Conservatory and Greenhouses with Botanical Laboratory and Lecture-room.

(7) A Laboratory for practical work in the Department of Chemistry.

(8) A good analyst, who, under the direction of the Professor of Chemistry, would spend most of his time in analysing soils, manures, foods, feeding-stuffs, etc., for the instruction of our students, and especially for the benefit of farmers throughout the Province, who are constantly sending samples for analysis.

Agricultural Education.

It is gratifying to observe that the question of agricultural education is beginning to excite a good deal of interest throughout this Province, and, I might say, throughout the whole Dominion. The press is waking up to the importance of the subject; and the Council of the Agricultural and Arts Association has lately inaugurated a scheme of annual examinations in branches of study bearing directly upon the work of the farm. On the results of these examinations, certificates will be granted, and no less than ten money prizes, ranging from $15 to $30 each, awarded annually to the most successful candidates, as follows:—

1st. To the *three* candidates for second-class certificates obtaining the greatest number of marks, $25, $20, and $15, respectively.

2nd. To the *three* candidates for second-class certificates, who have *never attended* any agricultural school or college in Canada or elsewhere, obtaining the greatest number of marks, $25, $20, and $15, respectively.

3rd. To the *four* candidates for *third*-class certificates, who have *never attended* any agricultural school or college in Canada or elsewhere, obtaining the highest number of marks, $30, $25, $20, and $15, respectively.

An outline of the course of reading necessary for these examinations has been prepared, and can be had on application to Henry Wade, Esq., Secretary of the Agricultural and Arts Association, Agricultural Hall, Toronto.

The questions will not be based on any particular book or books, nor are any text-books prescribed; but two lists of books are given, containing a few of the works that may be studied with advantage—No. 1 for all candidates, and No. 2 for those intending to write for second-class certificates:—

1. "First Principles of Agriculture" (Tanner); "Hand Book of Agriculture," embracing soils, manures, rotation of crops, and live stock (Wrightson); "Canadian Farmer's Manual of Agriculture" (Whitecombe); "Soil of the Farm" (Sir J. B. Lawes and others); "Catechism of Agricultural Chemistry and Geology" (Johnston)—new edition by Cameron.

2. "New American Farm Book" (Allen); "Talks on Manures" (Harris); "Chemistry of the Farm" (Warrington); "Elements of Agricultural Chemistry and Geology" (Johnston and Cameron); "Stock-Breeding" (Miles); "The Complete Grazier" (Youatt and Burn); "American Cattle" (Allen); "Feeding of Animals" (Stewart); "Manual of Cattle Feeding" (Armsby); "The Shepherd's own Book" (Youatt, Skinner and Randal); "Treatise on the Pig" (Harris); "Veterinary Adviser" (Law); "Insects Injurious to Vegetation" (Harris); "Insects Injurious to Fruit" (Saunders).

Such a course of study cannot fail to be a great benefit to the farmers' sons of this Province, and, indirectly, to all classes of the population. I need not enlarge on the advantages which are sure to result to the whole community from the reading and study of our agricultural papers and the best works on agriculture, stock-raising, and kindred subjects. I commend this course of reading to the young farmers of Ontario.

When the late Minister of Education authorized "The First Principles of Agriculture," by Professor Tanner, for use in the Public Schools of Ontario, he did a wise thing. He took a step in the right direction, but, in our opinion, did not go far enough. The book is authorized; but its use is optional, and the Normal Schools are doing nothing whatever to qualify the teachers of the Province for giving instruction in it. Something more is needed. The

rural constituencies are asking for something more—the young men who wish to prepare for the examinations of the Agriculture and Arts Association, are asking for something more; and I venture to express the hope that the new Minister of Education will give their requests the most favourable consideration.

So far as we can judge, they want three things:—

1. "The First Principles of Agriculture" placed in the fixed, instead of the optional, list of studies in all our rural Public Schools.
2. A course of lectures to all teachers in training at the Normal Schools, on—
   (1) Agriculture, Live Stock, and Dairying.
   (2) Forestry.
   (3) The beautifying of our homes.
3. A course of lectures on these topics, delivered at convenient centres throughout the Province on Saturdays, for Public School teachers who have already passed through the Model and Normal Schools.

One point more. It is altogether useless to pass a law compelling teachers to give instruction in subjects which they know little or nothing about. Consequently I venture to suggest that a competent man be appointed, as soon as possible, to lecture on the subjects just named, both in the Normal Schools and throughout the Province, as indicated in 2 and 3 above. Professor Henry Tanner, F.C.S., of the Institute of Agriculture, South Kensington, London, spends a portion of every year in lecturing to the Public School teachers of England on these very topics; and the services of such a man would, I think, be invaluable to us at the present time. Hence I take the liberty of inviting the attention of the Commissioner of Agriculture and the Minister of Education to this proposition, and beg to solicit for it the early consideration which its importance seems to demand.

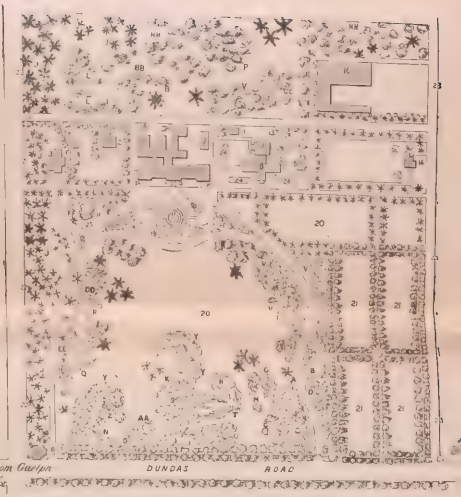
I have the honour to be, sir,

Your obedient servant,

JAMES MILLS,

President.

vain.



REFERENCES

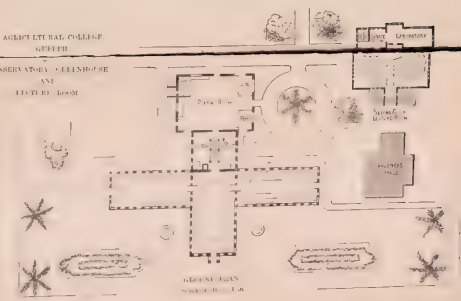
AGRICULTURAL COLLEGE, GUELPH

PLAN OF GROUNDS

MILLER & YATES, Landscape Architects, PHILADELPHIA, PA.

REFERENCES TO ARBORETUM.

AGRICULTURAL COLLEGE GUELPH PERSPECTIVE VIEW OF CONSERVATORY GREENHOUSE AND LECTURE ROOM.



APPENDIX 1.

1. COLLEGE ROLL FOR THE YEAR 1883.
2. COLLEGE ROLL FOR THE SESSION 1883-84 (1st Oct. to 31st March)

1. COLLEGE ROLL FOR THE YEAR 1883.

NAMES.	P. O. ADDRESS.	COUNTY, Etc.
Alderson, A. B.	Ottawa	Carleton.
Alexander, R. C.	Wendigo	Middlesex.
Ashworth, H. L.	London	England.
Annand, F. W. C.	Halifax	Nova Scotia.
Ardagh, A. E.	Barrie	Simcoe.
Austin, W. E.	Ottawa	Carleton.
Aylsworth, H.	Deseronto	Hastings.
Baldwin, E. H.	Everitt	Mass., U.S.
Ballantyne, A. W.	Stratford	Perth.
Black, C. H.	Amherst	Nova Scotia.
Black, P. C.	Windsor	Nova Scotia.
Black, D. A.	Elora	Wellington.
Beadle, C. D.	St. Catharines	Lincoln.
Beer, H. H.	Charlottetown	Prince Edward Island.
Begbie, E. A.	London	England.
Bent, E.	Belleville	Hastings.
Brodie, C. J.	Bethesda	York.
Brandon, R. C.	Canton	Ontario.
Braun, P. E.	Ottawa	Carleton.
Brown, W. J.	Fergus	Perth.
Boyle, Viscount R. H.	Castle Martyr	Ireland.
Boyle, Hon. H. G.	Castle Martyr	Ireland.
Boyd, J. L.	Toronto	York.
Bowes, J. C.	Halifax	Nova Scotia.
Buckingham, F. W.	Stratford	Perth.
Butler, G. C.	London	England.
Campbell, C. A.	Toronto	York.
Campbell, J. L.	Clarksburg	Grey.
Campbell, W. W.	Clarksburg	Grey.
Carlaw, C. M.	Warkworth	Northumberland.
Carpenter, P. A.	Collingwood	Simcoe.
Casswell, A. B.	Ingersoll	Oxford.
Clark, C.	Parkdale	York.
Clark, F. R.	Parkdale	York.
Climie, W. J.	Listowel	Perth.
Collins, H. J.	York	England.
Corson, G. H.	Hamilton	Wentworth.
Cowley, A. E.	Guelph	Wellington.
Courbarron, F. H.	St. Andrews	Scotland.
Creagh, A. H.	St. Leonards	England.
Creelman, J. A.	Collingwood	Grey.
Cream, W. C.	Paisley	Bruce.
Cross, E. L.	Montreal	Quebec.
Cutting,	Guelph	Wellington.
Davies, S.	Toronto	York.
Denton, E.	London	Middlesex.
Denne, T. H. G.	Peterboro'	Peterborough.
DeChadenèdes,	Guelph	Wellington.
DeVeber, W. H.	St. John	New Brunswick.
De Winton, W. F.	Ottawa	Carleton.
Erskine, H. R.	Ottawa	Carleton.
Edmondson, J. A.	Orillia	Simcoe.
Eddington, D. C.	Glencreggan	Scotland.
Finlayson, H.	Ottawa	Carleton.

1.—COLLEGE ROLL FOR THE YEAR 1883—*Continued.*

NAMES.	P. O. ADDRESS.	COUNTY, Etc.
Fotheringham, W.	St. Mary's	Perth.
Frith, H. M.	St. John	New Brunswick.
Fuller, S. G.	Stratford	Perth.
Fair, J. L.	South Monaghan	Northumberland.
Furner, G. H.	Toronto	York.
Gregory, J.	Fredericton	New Brunswick.
Garland, C. S.	Montreal	Quebec.
Greenwood, J. T.	Peterboro'	Peterborough.
Hannah, J.	Egmondville	Huron.
Hague, J. P.	Cobourg	Northumberland.
Henry, J. W.	Thornton	Simcoe.
Herbert, D. L.	St. Andrew's	Scotland.
Holcroft, H. S.	Orillia	Simcoe.
Hubbard, W. W.	Burton	New Brunswick.
Hanson, E. T.	Ottawa	Carleton.
Harvey, E. J.	Aylmer	Elgin.
Horsey, E. H.	Cataraqui	Frontenac.
Hamilton, R. M.	Brantford	Brant.
Hamilton, J. B.	Lennoxville	Quebec.
Harrison, F. W.	Owen Sound	Grey.
Ings, F. W.	Charlottetown	Prince Edward Island.
Jemison, W. A.	Thornton	Simcoe.
Jordan, A. W.	Simonds	New Brunswick.
Jeffs, H. B.	Bond Head	Simcoe.
Jones, T. L.	Aberystwith	Wales.
Jones' Williams, A. H.	Penpont, Brecon	Wales.
Keil, C. A.	Chatham	Kent.
Kemmis, J. H. W.	Dublin	Ireland.
Knott, E.	London	Middlesex.
Kelly, S. A. J.	Ancaster	Wentworth.
King, J. E.	Middlemarch	Elgin.
Laurie, C. A.	Quebec	Quebec.
Luton, E. E.	New Sarum	Elgin.
Latimer, R. M.	Marshville	Welland.
Lehmann, A.	Orillia	Simcoe.
Little, W.	Killyleagh	Simcoe.
Lane, H. R.	Surbiton, Surrey	England.
Lang, W.		Manitoba.
Langlois, R. J.	Toronto	York.
Leech, L. T.	Guelph	Wellington.
Lobb, E. W. T.	Hamilton	Wentworth.
Morden, T. T.	Walkerton	Bruce.
Moyle, F. T.	Paris	Brant.
Merritt, C. L.	Scotland	Simcoe.
McIntosh, G. H.	Mossboro'	Wellington.
McLean, J. R.	Innerkip	Oxford.
Mohr, A.	Cincinnati	Ohio.
Malcolmson, K. G.	East Barnet, Herts	England.
McLennan, D.	Camerontown	Glengarry.
McLennan, J. D.	Lancaster	Glengarry.
McKim, J.	Parker	Wellington.
McLennan, A.	Ottawa	Carleton.
Morton, F. G.	Barrie	Simcoe.
Maunsell, G. S.	Ottawa	Carleton.
Mcdonald, J.	Petrolia	Lambton.
Macdonald, W. A.	Stratford	Perth.
Major, C. H.	Lyn	Leeds.
Mathewson, G.	Lennoxville	Quebec.
Miller, J. P.	Norwich	England.
McNish, C. H.	Lyn	Leeds.
McGregor, J.	Colborne	Northumberland.
Macalister, T. G.	Kingston	Frontenac.
Malcolm, G. J.	Agra	India.
Mavor, H.	Toronto	York.
McCarthy, D. J.	Peterboro'	Peterborough.
McIntyre, D.	Paisley	Bruce.
McKay, J. B.	Stellarton	Nova Scotia.
McPherson, D.	Glanworth	Middlesex.
McPherson, A.	Montreal	Quebec.

1.—COLLEGE ROLL FOR THE YEAR 1883—*Continued.*

NAMES.	P. O. ADDRESS.	COUNTY, Etc.
McPherson, H. A.	Lancaster	Glengarry.
Meikle, G. W.	Lachute	Quebec.
Morris, D. W.	Montreal	Quebec.
Muir, J. B.	North Bruce	Bruce.
Matson, J. S.	Toronto	York.
Neilson, J.	Lyn	Leeds.
Nairn, J.	Toronto	York.
Ord, W. B.	Toronto	York.
Pearce, J. W.	Aylmer	Elgin.
Pethick, W. H.	Charlottetown	Prince Edward Island.
Poe, J. J. E.	Callan	Ireland.
Perry, D. E.	Ottawa	Carleton.
Paton, G. C.	Langside	Scotland.
Powys, P. C.	Fredericton	New Brunswick.
Pritchard, R. M.	Port Hope	Durham.
Pocock, H. R.	Brockville	Leeds.
Quinn, E.	Orillia	Simcoe.
Reford, F. W.	Toronto	York.
Redmond, W. J.	Peterboro'	Peterborough.
Ruel, F. C.	Southsea	England.
Robinson, J. D.	Middlemarch	Elgin.
Robertson, W.	Wanstead	Lambton.
Rennie, E. A.	Hamilton	Wentworth.
Raynes, G. S.	Montreal	Quebec.
Rose, G. M.	Toronto	York.
Ramsay, A. R.	Montreal	Quebec.
Raynor, T.	Rose Hall	Prince Edward.
Reid, P.	Montreal	Quebec.
Ridings, H. L.	Colborne	Northumberland.
Read, F. Read	Bobcaygeon	Victoria.
Robinson, B.	Wheatley	Kent.
Rowat, J. T.	Hillsdale	Simcoe.
Ross, J. H.	New Glasgow	Nova Scotia.
Saxton, E. A.	Nantwich	England.
Slater, H.	Taunton	England.
Steers, O.	Ottawa	Carleton.
Sharman, G. C.	Stratford	Perth.
Sharman, H. B.	Stratford	Perth.
Skaife, F. W.	Montreal	Quebec.
Schroeder, R.	Toronto	York
Smith, A.	Simcoe	Norfolk.
Smith, E. P.	Port Hope	Durham.
Spalding, F. J.	Perth	Lanark.
Stamer, O. P.	Hubbard's Cove	Nova Scotia.
Sworder, E.	Qu'Appelle	Manitoba.
Sworder, R.	Qu'Appelle	Manitoba.
Shaw, A. G.	Wolverhampton	England.
Shaw, E. E.	Wolverhampton	England.
Spohn, H. B.	Lancaster	Wentworth.
Soden, F. H.	London	England.
Sinclair, Q. P.	Montreal	Quebec.
Sarjeant, E.	Hawkstone	Simcoe.
Smith J. L.	Ottawa	Carleton.
Strange, A. W.	Kingston	Frontenac.
Smith, J. A.	Martintown	Glengarry.
Schwartz, J.	Quebec	Quebec.
Tewson, F. R.	Markham	York.
Thomas, F. J.	Oxford	England.
Torrance, W. J.	Ottawa	Carleton.
Tourangeau	Quebec	Quebec.
Tucker, H. V.	Toronto	York.
Thompson, W. D.	Guelph	Wellington.
Urmston, R. B.	Southsea	England
Vivian, H.	Mohawk	Brant.
Weatherston, N.	Toronto	York.
Wilson, T. G.	Hawkstone	Simcoe.
Walsh, E. F.	Luton, Bedfordshire	England.
White, C. D.	Hereford	England.
Warren, F. F.	Kingston	Frontenac.

1.—COLLEGE ROLL FOR THE YEAR 1883—*Continued.*

NAMES.	P. O. ADDRESS.	COUNTY, Etc.
Westlake, G.	Yarmouth Centre	Elgin.
Wilmot, E. M.	London	England.
Weatherston.	Toronto	York.
Willis, W. B.	Whitby	Ontario.
Weston, G. H.	Ottawa	Carleton.
Watterworth, G. E.	Ingersoll	Oxford.
Whitehead, J.	Brampton	Peel.
Whitehead, R.	Broadstairs	England.
Wark, A. E.	Wanstead	Lambton.
Wroughton, T. A.	Montreal	Quebec.
Total		202

2. COLLEGE ROLL FOR THE SESSION 1883-84 (1st Oct. to 31st March).

NAMES.	P. O. ADDRESS.	COUNTY, Etc.
Alderson, A. B.	Ottawa	Carleton.
Alexander, R. C.	Wendigo	Middlesex.
Ashworth, H. L.	London	England.
Annand, F. W. C.	Halifax	Nova Scotia.
Austin, W. E.	Ottawa	Carleton.
Baldwin, E. H.	Everitt	Mass., U. S.
Ballantyne, A. W.	Stratford	Perth.
Black, P. C.	Windsor	Nova Scotia.
Beadle, C. D.	St. Catharines	Lincoln.
Beer, H. H.	Charlottetown	Prince Edward Island.
Begbie, E. A.	London	England.
Bent, E.	Belleville	Hastings.
Brodie, C. J.	Bethesda	York.
Brown, W. J.	Fergus	Wellington.
Buckingham, F. W.	Stratford	Perth.
Butler, G. C.	London	England.
Campbell, C. A.	Toronto	York.
Campbell, J. L.	Clarksburg	Grey.
Campbell, W. W.	Clarksburg	Grey.
Carlaw, C. M.	Warkworth	Northumberland.
Carpenter, P. A.	Collingwood	Simcoe.
Casswell, A. B.	Ingersoll	Oxford.
Climie, W. J.	Listowel	Perth.
Collins, H. J.	York	England.
Corson, G. H.	Hamilton	Wentworth.
Cowley, A. E.	Guelph	Wellington.
Courbarron, F. H.	St. Andrews	Scotland.
Creagh, A. H.	St. Leonards	England.
Cross, E. L.	Montreal	Quebec.
Cutting.	Guelph	Wellington.
Davies, S.	Toronto	York.
Denton, E.	London	Middlesex.
Erskine, H. R.	Ottawa	Carleton.
Fuller, S. G.	Stratford	Perth.
Fair, J. L.	South Monaghan	Northumberland.
Furner, G. H.	Toronto	York.
Greenwood, J. T.	Peterboro'	Peterborough.
Hannah, J.	Egmondville	Huron.
Hague, J. P.	Cobourg	Northumberland.
Henry, J. W.	Thornton	Simcoe.
Herbert, D. L.	St. Andrews	Scotland.
Holcroft, H. S.	Orillia	Simcoe.
Hubbard, W. W.	Burton	New Brunswick.
Jemison, W. A.	Thornton	Simcoe.
Jordan, A. W.	Simonds	New Brunswick.

2.—COLLEGE ROLL FOR THE YEAR 1883-84—*Concluded.*

NAMES.	P. O. ADDRESS.	COUNTY, Etc.
Jones, T. L.	Aberystwith	Wales.
Keil, C. A.	Chatham	Kent.
Kemmis, J. H. W.	Dublin	Ireland.
Knott, E.	London	Middlesex.
King, J. E.	Middlemarch	Elgin.
Lehmann, A.	Orillia	Simcoe.
Little, W.	Killyleagh	Simcoe.
Lane, H. R.	Surbiton, Surrey	England.
Lang, W.		Manitoba.
Langlois, R. J.	Toronto	York.
Leech, L. T.	Guelph	Wellington.
Lobb, E. W. T.	Hamilton	Wentworth.
Macdonald, W. A.	Stratford	Perth.
Major, C. H.	Lyn	Leeds.
Mathewson, G.	Lennoxville	Quebec.
Miller, J. T.	Norwich	England.
McGregor, J.	Colborne	Northumberland.
MacAlister, T. G.	Kingston	Frontenac.
Malcolm, G. P.	Agra	India.
Mavor, L.	Toronto	York.
McCarthy, D. J.	Peterboro'	Peterborough.
McIntyre, D.	Paisley	Bruce.
McKay, J. B.	Stellarton	Nova Scotia.
McPherson, A.	Montreal	Quebec.
McPherson, H. A.	Lancaster	Glengarry,
Meikle, G. W.	Lachute	Quebec.
Morris, D. W.	Montreal	Quebec.
Muir, J. B.	North Bruce	Bruce.
Matson, J. S.	Toronto	York.
Nairn, J.	Toronto	York.
Pethick, W. H.	Carlottetown	Prince Edward Island.
Powys, P. C.	Fredricton	New Brunswick.
Pritchard, R. M.	Port Hope	Durham.
Quinn, E.	Orillia	Simcoe.
Rose, G. M.	Toronto	York.
Ramsay, A. R.	Montreal	Quebec.
Raynor, T.	Ross Hall	Prince Edward Island.
Reid, P.	Montreal	Quebec.
Ridings, H. L.	Colborne	Northumberland.
Read, F.	Bobcaygeon	Victoria.
Robinson, B.	Wheatley	Kent.
Rowat, J. T.	Hillsdale	Simcoe.
Ross, J. H.	New Glasgow.	Nova Scotia.
Saxton, E. A.	Nantwich	England.
Slater, H.	Taunton	England.
Steers, O.	Ottawa	Carleton.
Sharmon, G. C.	Stratford	Perth.
Skaife, F. W.	Montreal	Quebec.
Schroeder, R.	Toronto	York.
Smith, A.	Simcoe	Norfolk.
Smith, E. P.	Port Hope	Durham.
Spalding, F. J.	Perth	Lanark.
Stamer, O. P.	Hubbard's Cove	Nova Scotia.
Sworder, E.	Qu'Appelle	Manitoba.
Sworder, R.	Qu'Appelle	Manitoba.
Tewson, F. R.	Markham	York.
Tucker, H. V.	Toronto	York.
Thompson, W. D.	Guelph	Wellington.
Vivian, K.	Mohawk	Brant.
Wilson, T. G.	Hawkstone	Simcoe.
Walsh, E. F.	Liton, Bedfordshire	England.
Weatherston W.	Toronto	York.
Wark, A. E.	Wanstead	Lambton.
Wroughton, T. A.	Montreal	Quebec.
Total		109

APPENDIX 2.

TIME TABLES FOR FALL TERM (1st October to 22nd December), 1883.

Tables No. 1 and No. 2 indicate the work of the regular students, and No. 3 (A) and (B) the work of the specialists in Live Stock and Veterinary Science, for the term ending the 22nd December, 1883. No. 1 is the same as No. 2, and 3 (A) the same as 3 (B), except the order of the lectures, which change from forenoon to afternoon, and *vice versa* at the beginning of each week, to suit the arrangements for practical work in the outside departments.

TIME TABLE No. 1.

2nd Year.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-12	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departm's
Afternoon.	2-3	English Literature.	Statics.	English Literature.	English Literature.	Levelling and Drainage.	Half Holiday.
	3-4	Agricultural Chemistry.	Agricultural Chemistry.	Practical Live Stock.	Meteorology.	Agricultural Chemistry.	
	4-5	Veterinary Pathology.	Agriculture.	English Composition.	Veterinary Pathology.	Practical Horse.	

1st Year.

	Hours.	Monday.	Tuesday.	Wednesday	Thursday.	Friday.	Saturday.
Forenoon.	7-12	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departm's.
Afternoon.	2-3	Arithmetic.	English Composition.	Agriculture.	2. Arithmetic. 2.40. Book-keeping. 3.20. Human Physiology and Sanitary Science.	Agriculture.	Half Holiday.
	3-4	Agriculture.	Human Physiology and Sanitary Science.	English Literature.		English Literature.	
	4-5	Inorganic Chemistry.	Veterinary Anatomy.	Inorganic Chemistry.	Inorganic Chemistry.	Veterinary Anatomy.	

TIME TABLE No. 2.

2ND YEAR.

	Hours	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-8	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Half Holiday.
	8-9	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	
	9-10	English Literature.	Statics.	English Literature.	English Literature.	Levelling or Drainage.	
	10-1	Agricultural Chemistry.	Agricultural Chemistry.	Practical Live Stock.	Meteorology	Agricultural Chemistry.	
	11-12	Veterinary Pathology.	Agriculture.	English Composition.	Veterinary Pathology.	Practical Horse.	
Afternoon.	1.30-5	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departm's.

1ST YEAR.

	Hours	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	
Forenoon.	7-8	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Half Holiday.
	8-9	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	
	9-10	Arithmetic.	English Composition.	Agriculture.	9. Arithmetic. 9.40. Book-keeping. 10.20. Human Physiology. and Sanitary Science.	Agriculture.	
	10-11	Agriculture.	Human Physiology and Sanitary Science.	English Literature.		English Literature.	
	11-12	Inorganic Chemistry.	Veterinary Anatomy.	Inorganic Chemistry.	Inorganic Chemistry.	Veterinary Anatomy.	
Afternoon.	1.30-5	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Works in outside departments.	Work in outside departm's.

TIME TABLE No. 3.—SPECIAL CLASS.

(A) 2ND YEAR.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-12	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.
Afternoon.	2-3	Live Stock in Class-room.	Study of Text-Book on Veterinary Practice.	Study of Text-Book on Live Stock.	Live Stock in Class-room.	Study of Text-Book on Live Stock.	Half Holiday.
	3-4	Study of Text-Book on Live Stock.	Veterinary Science or Practice.	Live Stock in Class-room.	Study of Text-Book on Veterinary Practice.	Study of Text-Book on Veterinary Practice.	
	4-5	Veterinary Pathology.	Agriculture.	Veterinary Science or Practice.	Veterinary Pathology.	Practical Horse.	

1ST YEAR.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-12	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.
Afternoon.	2-3	Live Stock in Class-room.	Study of Text-Book on Veterinary Practice.	Agriculture.	Live Stock in Class-room.	Agriculture.	Half Holiday.
	3-4	Agriculture.	Veterinary Science or Practice.	Study of Text-Book on Live Stock.	Study of Text-Book on Veterinary Practice.	Veterinary Anatomy.	
	4-5	Study of Text-Book on Live Stock.	Veterinary Anatomy.	Veterinary Science or Practice.	Study of Text-Book on Live Stock.	Study of Text-Book on Veterinary Practice.	

TIME TABLE No. 3.—SPECIAL CLASS.—*Continued.*

(B) 2ND YEAR.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-8	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Half Holiday.
	8-9	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	
	9-10	Live Stock in Class-room.	Study of Text-Book on Veterinary Science.	Study of Text-Book on Live Stock.	Live Stock in Class-room.	Study of Text-Book on Live Stock.	
	10-11	Study of Text-Book on Live Stock.	Veterinary Science or Practice.	Live Stock in Class-room.	Study of Text-Book on Veterinary Practice.	Study of Text-Book on Veterinary Practice.	
	11-12	Veterinary Pathology.	Agriculture.	Veterinary Science or Practice.	Veterinary Pathology.	Practical Horse.	
Afternoon.	1.30-5	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.

1ST YEAR.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-8	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Half Holiday.
	8-9	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	
	9-10	Live Stock in Class-room.	Study of Text-Book on Veterinary Science.	Agriculture.	Live Stock in Class-room.	Agriculture.	
	10-11	Agriculture.	Veterinary Science or Practice.	Study of Text-Book on Live Stock.	Study of Text-Book on Veterinary Practice.	Veterinary Anatomy.	
	11-12	Study of Text-Book on Live Stock.	Veterinary Anatomy.	Veterinary Science or Practice.	Study of Text-Book on Live Stock.	Study of Text-Book on Veterinary Practice.	
Afternoon.	1.30-5	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.

APPENDIX 3.

ONTARIO AGRICULTURAL COLLEGE.

EXAMINATION PAPERS.

I. PAPERS SET AT THE SESSIONAL EXAMINATIONS, EASTER, 1883.
II. PAPERS SET AT THE SESSIONAL EXAMINATIONS, JUNE, 1883.
III. PAPERS SET AT THE MATRICULATION EXAMINATIONS, OCTOBER, 1883.

I. PAPERS SET AT THE SESSIONAL EXAMINATIONS, EASTER, 1883.

ONTARIO AGRICULTURAL COLLEGE, EASTER EXAMINATIONS, 1883.

FIRST YEAR.

LIVE STOCK: CATTLE.

Examiner: WM. BROWN.

1. Make concise notes on the history of the three principal beefing breeds, and the three prominent milking breeds, as handled by you this winter.

2. Explain the meaning of the terms: rough, chunky, even, deep, roomy, sweet, prime, finished, and quality, when applied to cattle.

3. Make a table showing the relative positions of all the pure breeds of cattle here, in regard to maturing, hardiness, and quantity of milk, according to our experience.

4. Give, in proper form, the pedigree of a Short Horn bull called "O.A.C," imported from England to the United States, and afterwards brought to Canada. Register in the Herd Books of each country, and draft up to the 5th sire.

5. Describe the general stamp of a typical milch cow, and say what you would expect her to yield per season, of milk, cream, butter and cheese.

FIRST YEAR.

LIVE STOCK: SHEEP.

Examiner: WM. BROWN.

1. The two samples of Wool require to be classified and compared in regard to texture, soundness, spirals, and lustre.

2. Give a thorough description of the Oxford Down breed, naming everything you know in regard to their history and characteristics.

EASTER EXAMINATIONS, 1883.—Continued

3. On the accompanying card fill in and complete the valuation of the Shropshire and South Down—using the maximums given on the black-board.

4. Compare the Leicester and South Down, as regards build of carcass, irrespective of size.

5. What is the present position of the Canadian market for wool and mutton?

FIRST YEAR.

PRACTICAL EXAMINATION OF SHEEP.

Examiners: Wm. Brown and P. J. Woods.

1. Point out the defects of the Oxford Down and Shropshire grades, and indicate their quality for the butcher.

2. Describe the fleeces present.

3. Point out the marked differences in the build of the two rams.

Time—9 minutes each student.

FIRST YEAR.

INORGANIC CHEMISTRY.

Examiner: R. B. Hare, Ph. Dr.

1. Define "*Atomicity*" and "*Basicity.*"

Write down the formulæ of,

(*i*). The chlorides of silicon, silver, bismuth, barium, gold, iron, magnesium, and platinum.

(*ii*). The sulphates and phosphates of potassium, calcium, and manganese.

2. Describe the occurrence, preparation and properties of oxygen gas.

(*i*). You are given oxygen, nitrous oxide, nitric oxide, carbon monoxide, marsh gas, hydrogen, and sulphur dioxide gases in separate bell-jars, how would you proceed to distinguish them?

(*ii*). State the action produced (1) by *animals* (2) by plants on the *air.*

3. How many cub. centimeters of ammonia gas measured at 15°, under a pressure of 750 mm. can be obtained from 150 grams of ammonium chloride?

4. Describe the occurrence, preparation and properties of sulphur.

(*i*). Write down the *names* and *symbols* of the oxides of sulphur.

(*ii*). If the oxides are acid-forming oxides, give the formulæ for the corresponding acids.

5. Describe the occurrence, preparation and properties of phosphorus.

(*i*). Write down the *names* and *symbols* of the oxides of phosphorus.

(*ii*). If the oxides are acid-forming oxides, give the formulæ for the corresponding acids.

EASTER EXAMINATIONS, 1883.—Continued.

6. Describe the occurrence, preparation and properties of chlorine.

(*i*). Write down the *names* and *symbols* of the oxides of chlorine.

(*ii*). If the oxides are acid-forming oxides, give the formulæ for the corresponding acids.

7. Draw a diagram of the apparatus you would make use of, in the preparation of hydrogen, nitrogen, laughing gas, nitric acid, hydrochloric acid, and sulphur trioxide.

8. How would you illustrate by experiment the bleaching action of chlorine and of sulphur dioxide; the oxidizing action of nitric acid and the nitrates, *and* the properties of charcoal, carbon dioxide, ammonia and hydrochloric acid?

9. Formulate the decompositions occurring in the preparation of nitrogen dioxide, carbon monoxide, methyl hydride, phosphuretted hydrogen, and silicon tetrafluoride.

10. (*i*). How would you prepare soluble and insoluble silicon?

(*ii*). Formulate the action that occurs when silicon tetrafluoride is allowed to bubble up in water.

(*iii*). How may "temporary" and "permanent" hardness be removed from water?

11. Describe any experiment you have made or seen made.

☞ The student can exercise a choice between the 4th, 5th and 6th questions of the paper.

FIRST YEAR.

ORGANIC CHEMISTRY.

Examiner: R. B. Hare, Ph. Dr.

1. (*i*). Name the chief peculiarities of the carbon compounds.

(*ii*). Illustrate by structural formulæ the difference between "*saturated*" and "*non-saturated*" carbon compounds.

(*iii*). Explain what is meant by "*isomeric bodies*" and "homologous series," giving examples.

2. Give names and formulæ of the best known members of the Paraffin Group. The paraffins are called *hydrides* of certain compound radicals.

(*i*). Write down the names and formulæ of these radicals.

(*ii*). Using these radicals, represent graphically the constitution of the primary monatomic alcohols.

3. Explain by typical formulæ the relation existing between—

(*i*). Methyl alcohol, ether, and aldehyde, formic acid and formamide.

(*ii*). Ethyl alcohol, ether and aldehyde, acetic acid and acetamide.

(*iii*). What is the chemical change that occurs in the passage from a primary alcohol to the corresponding acid?

4. Write down a list of the olefines, with their formulæ.

(*i*). Explain what is meant by a diatomic alcohol.

(*ii*). Represent by structural formulæ the relation *lactic acid* and *oxalic acid* bear to the diatomic alcohols.

5. Explain the composition of the "*drying*" and "*non-drying*" oils and fats. What is soap?

EASTER EXAMINATIONS, 1883.—Continued.

FIRST YEAR.

PHYSIOLOGY AND ZOOLOGY.

Examiner: J. Playfair McMurrich, M.A.

1. Cartilage. Where is it principally found, and what are its uses?

2. Discuss the question of bathing from a physiological standpoint.

3. Describe the digestion of an ordinary meal.

4. Describe briefly the early development of any animal.

5. Rudimentary organs. What is meant by this term? How may their presence be explained?

6. Describe the life-history of *Trichina spiralis*.

7. Compare the sub-classes *Myriapoda*, *Insecta*, and *Arachnida*.

8. Compare the structure of the heart in the *Pisces*, *Reptilia*, *Aves*, and *Mammalia*.

9. Mention the principal birds that feed partly on the wing and partly at rest. Discuss the usefulness of each.

FIRST YEAR.

VETERINARY ANATOMY.

Examiner: F. C. Grenside, V.S.

1. Mention the structures entering into the formation of the teeth, stating which is the hardest and which is the most abundant.

2. State the difference between the teeth of the mare and the horse; also the number of permanent teeth possessed by ruminants, the pig, dog and cat, as well as the number of permanent teeth a horse has at three and a half years old.

3. Describe the Trachea, Bronchi and Bronchial Tubes.

4. Mention the chief differences between the intestines, liver, kidneys, and genital organs of the horse and ox.

5. Describe the process of rumination.

6. Describe the Œsophagus, and the course which it takes with respect to the other organs.

7. Describe the valves of the heart.

8. Mention an artery that transmits venous blood, and veins that convey arterial, also a vein that begins in capillaries and ends in capillaries.

9. How do arteries differ from veins anatomically, and state the colour of the blood conveyed by each system.

10. Give a description of the Genital Organs of the mare, and state how they differ from those of the cow.

EASTER EXAMINATIONS, 1883.—Continued.

FIRST YEAR.

ENGLISH LITERATURE.

Examiner: J. PLAYFAIR MCMURRICH, M.A.

1. "A royal messenger he came,
Though most unworthy of the name.—
A letter forged! Saint Jude to speed!
Did ever knight so foul a deed!
At first in heart it liked me ill,
When the King praised his clerky skill.
Thanks to Saint Bothan, son of mine,
Save Gawain, ne'er could pen a line;
So swore I, and I swear it still
Let my boy-bishop fret his fill."

(*a*) Under what circumstances were these words spoken?

(*b*) "A letter forged!" Explain the allusion.

(*c*) "Saint Jude to speed!" Explain.

(*d*) "It liked me ill." What form of expression is this? Give examples of other words used similarly.

(*e*) Write notes on *King, Saint Bothan,* and *Gawain.*

2. Describe the metre of Marmion giving quotations in illustration.

3. "The pheasant in the falcon's claw,
He scarce will yield to please a daw."

By whom were these words spoken? Explain the metaphor.

4. Give the derivation and meaning of the following words:—pavilion, monarch, tyrant, ambition, patriot.

5. "To men of other minds my fancy flies,
Embosom'd in the deep where Holland lies:
Methinks her patient sons before me stand,
Where the broad ocean leans against the land,
And, sedulous to stop the coming tide,
Lift the tall rampire's artificial pride.
Onward, methinks, and diligently slow,
The firm connected bulwark seems to grow,
Spreads its long arms amid the watery roar,
Scoops out an Empire, and usurps the shore."

(*a*) To what physical feature of Holland does Goldsmith refer?

(*b*) "To men of other minds," "artificial pride." Explain.

(*c*) Point out the figures of speech in the extract.

6. What was Goldsmith's object in writing "The Traveller"?

7. Give Goldsmith's estimate of England, and Englishmen.

FIRST YEAR.

COMPOSITION.

Examiner: JAS. MILLS, M.A.

1. Write a composition on one of the following subjects:—

(1) Order and cleanliness in our homes.

EASTER EXAMINATIONS, 1883.—Continued.

(2) What a farmer's Education in this Province should be.

(3) Should the standard for admission to this College be raised : or the course of study lengthened to three years ? If so, what subjects should be added or omitted, and what changes made ?

2. Comment briefly on each of the leading peculiarities of poetic diction.

3. Give rules for use of the *colon* and the *semicolon*, and for punctuating *appositives*, *equivalents*, and *repetitions*.

4. Supply the necessary capital letters and punctuation marks in the following sentences :—

(*a*). Horace Jones jr MD LL D FRS

(*b*). So eagerly the fiend oer bog or steep through straight rough dense or rare with head hands wings or feet pursues his way

(*c*). He is a a a excuse me but I must say it a cold-blooded villain "Inform me friend is alonzo the peruvian confined in this dungeon" "he is" "I must speak with him" "you must not" "he is my friend" "not if he were your brother" "what is to be his fate" "he dies at sunrise" "ha then I am come in time"

I agree with the honorable gentleman Mr Allen that it is pleasing to every generous mind to obey the dictates of sympathy but sir truth and justice impose on us higher obligations Lengthened applause and confusion in the galleries during which several sentences were lost Mr chairman I can not vote for this resolution Cheers I owe it not only to my country but to the rights of man of which so much is said to preserve the wise and long-established policy of the former and to stand by the principle of non-intervention as a high moral defence and security for the latter The speaker took his seat amid loud applause

5. Give the rule for each point inserted in sentence (*b*).

FIRST YEAR.

ARITHMETIC.

Examiner : E. L. Hunt.

1. If wire fencing cost 70 cents a yard, what will it cost to enclose a field 168 yards long and 126 yards wide ?

2. A bought 37 head of cattle for $1,332, and after keeping them for 3 months and paying $4 each per month for their keep, sold the lot for $2,257. Find the gain on each.

3. A sold to B on March 13th :—

280	bushels	wheat	@	$1 25	per bushel
170	"	peas	"	0 60	"
290	"	barley	"	0 70	"
175	"	oats	"	0 40	"

and took B's note for the amount, due 6 months after date. On July 5th, he got the note discounted at the Bank at 6 per cent. How much did he receive for it ?

4. The true discount off a note of $1,558, drawn at 6 months, is $38. Find rate per cent.

5. In a School Section a School House is to be built at an expense of $4,365, to be defrayed by a tax levied on property valued at $800,000. What is rate of taxation to

EASTER EXAMINATIONS, 1883.—Continued.

cover both cost of house and collector's commission at 3 per cent? (*b*) What tax must A pay, whose property is valued at $4,800?

6. Explain very briefly some of the principal causes of rise and fall in the price of stocks:

I hold $25,000 of Bank Stock, yielding 7 per cent. yearly dividend. I sell out at 124¾—brokerage ¼ per cent.—and invest the proceeds in Railway bonds selling at 82½ and yielding 5 per cent. yearly dividends—brokerage ½ per cent. Find the difference in my income.

7. I sold 2 horses for $140 each, thereby gaining 25 per cent. on one, and losing 25 per cent. on the other. Did I gain or loose on the whole, and how much?

8. A's property is insured for 4-5ths of its value. The premium of Insurance at ¼ per cent. amounts to $25. If property is destroyed, find A's entire loss.

9. I send 850 bushels wheat to an agent, who sells it for $1.30 a bushel, charging 2 per cent. commission. He invests the proceeds for me in cattle, after deducting his commission for this, at 3 per cent. Find the amount invested in cattle, also agent's total commission.

10. A and B working together can do a piece of work in 22 days. B and C in 20 days. A, B and C in 14 days. (*a*) How long would it take B alone to do the work?

(*b*) If A, B and C work together for 4 days, and B and C then leave, how long will it take A to finish?

SECOND YEAR.

AGRICULTURE.

Examiner: Wm. Brown.

1. The proper construction of buildings for mixed farming in Ontario involves certain principles; define these and apply them in a description of what you consider model barns.

2. How much importance is generally placed on Fertilizers being influenced in their action on crops by the particular physical condition of the soil, as well as the washing away by rains? Mention the other influences that regulate manures.

3. Define the proper place of permanent pasture in association with mixed farming in Ontario, and show wherein its value consists.

4. What are the ordinary evidences of the necessity of Drainage; what regulates the depth and distance apart of drains, and in what manner do you expect a return for the outlay?

5. Climate, soil, and markets regulate the production of particular crops,—what other conditions do so, and apply the whole subject to Ontario at the present moment.

SECOND YEAR.

LIVE STOCK.

Examiner: Wm. Brown.

1. By what would you be guided in choosing part of this Continent for the large and cheap production of mutton and wool, for the present markets?

2. Give a concise sketch of the stamp, conduct and financial position of the various Grade Shearling Wethers bred and fed by us.

EASTER EXAMINATIONS, 1883.—Continued.

3. As a producer of thoroughbred live stock Ontario has advantages and disadvantages. Name these and sketch the present position of the country in this respect.

4. Name all the points that have to be attended to in the experimental feeding of cattle, and show wherein our work here is incomplete.

SECOND YEAR.

PRACTICAL EXAMINATION OF CATTLE.

Examiners: JOHN HOBSON AND CHAS. DRURY, M.P.P.

1. Mention the strong and weak points of the White Steer.

2. Judge the two Grade Steers for 1st and 2nd prizes, giving reasons for your decision.

3. Compare the Hereford Steer with the standard for a first-class animal of the breed.

4. Indicate what you consider the three best points in the Angus Cow taken as a representative of the beefing breeds.

SECOND YEAR.

ARBORICULTURE.

Examiner: WM. BROWN.

1. What are the causes that are forcing nations to the study and practice of this science and art?

2. What is the general position of Ontario as regards forest area, and in what special respects is the country in need of tree cultivation?

3. Define the full meaning of Conservation and Replanting, and show to what extent each is applicable to Ontario.

4. As a cultivated crop, with a view to direct revenue, specify the principal duties in the practical management of plantations from the seed-bed up to maturity.

5. What would you advise in order to the thorough execution of all that Ontario requires in Arboriculture?

SECOND YEAR.

AGRICULTURAL CHEMISTRY.

Examiner: R. B. HARE, PH.DR.

1. Classify the proximate elements of the volatile part, and briefly describe the ultimate elements of the fixed part of plants.

(*i*). Point out the distinguishing physical and chemical properties of cane sugar, grape sugar, starch, and dextrin.

(*ii*). What is the constitution of beef suet, sheep's tallow and butter?

(*iii*). Distinguish between the indispensable and supplementary elements of the fixed part of plants.

2. Explain briefly the origin and mode of formation of soils.

(*i*). How would you make a mechanical analysis of soil?

(*ii*). Distinguish chemically between granitic, syenitic, and fossiliferous rock-soils.

(*iii*). In visiting a new country, how would you ascertain the *natural* strength of the land.

EASTER EXAMINATIONS, 1883.—Continued.

3. Explain the origin and constitution of the humus of the soil.

(*i*). How would you bring the ulmic, humic, apocrenic, and crenic acids into solution, and then precipititate them from solution?

(*ii*). What salts of these acids are soluble, what insoluble?

(*iii*). How does the carbonate of lime, when applied to a peat bog, act upon the nitrogenous and non-nitrogenous compounds contained in it?

4. Explain the spstem of "Co-operative experimenting as a means of studying the effect of fertilizers and the feeding capacities of plants" we have concluded to follow in some of the field experiments of this year.

5. Explain the different modes in which nitrification takes place.

(*i*). Describe the experiments which Schlæsing and Muntz and Lawes and Gilbert have made with organic matter nitrifying.

(*ii*). Explain the conditions that favour, and those that are adverse to nitrification.

6. Give some of the most important results which Lawes and Gilbert, of England, have obtained at Rothamsted with permanent meadow grass, with wheat, with barley, with oats, and with beans, on the same land, without manure, with farm-yard manure, and with a variety of chemical manures, since 1843.

(*i*). Particularize the results obtained from alternating *wheat* with *beans*.

(*ii*). What cure do they propose for land that is called "*clover sick*."

7. Give the characteristic composition of cereals, leguminous and root crops.

(*i*). Is the composition of a crop a sufficient guide to the character of the manure appropriate to it?

(*ii*). To secure a full cereal, leguminous or root crop from a somewhat impoverished soil, what artificial manure would you use in each case?

8. (*i*). What are the results of *bare* fallow? State briefly the circumstances under which it can be used systematically with advantage.

(*ii*). Describe the advantages which green crops fed on the land or plowed in have over bare fallow.

(*i*). Define "digestion co-efficient," "starch equivalent, "nutritive ratio," and "feeding standard."

(*ii*). For the maintenance of an ox, and for a milch cow, weighing each 1000 lbs., what amount of digestible albuminoids and carbohydrates must the daily ration contain?

10. A *fodder* containing $1\frac{1}{2}$ lbs. Clover hay,
13 " Barley straw,
25 " Mangolds,
$\frac{1}{2}$ " Rape Cake,
is given as a feeding standard.

Composition of Fodder:

	Clover Hay.	Barley Straw.	Mangolds.	Rape Cake.
Water	16	14.3	88.0	15.0
Ash	5.3	4.1	0.8	7.4
Albuminoids	12.3	4.0	1.1	30.3
Crude Fiber	26.0	40.0	0.9	13.8
Carbohydrates	38.2	36.2	9.1	23.8
Fat	2.2	1.4	0.1	9.5

Give the "nutritive ratio" of this fodder.

☞ The student can exercise a choice between the 3rd, 6th and 9th questions of the paper.

EASTER EXAMINATIONS, 1883.—Continued.

SECOND YEAR.

METEOROLOGY.

Examiner: R. B. HARE, PH. DR.

1. Mention some of the most important physical properties of the atmosphere, specially emphasizing its compressibility, its expansion by heat, its weight, its chemical composition, the cooling effect of evaporation and of rarefaction, the diathermacy of dry air, and the heat absorbing power of aqueous vapour.

2. Explain the structure of Adie's marine barometer.

(i) What is meant by "*Correction* for *Capillarity*," "*Correction* for *Gravitation*," and "*Correction* for *Capacity*" in barometers?

(ii) How is the correction for Capacity avoided in the barometers of Fortin and Adie?

3. Describe Negretti and Zambra's Maximum thermometer. How is the small inaccuracy in its reading occasioned?

4. *(i)* Define "*Relative Humidity*" and "*Dew Point.*"

(ii) When does the *wet bulb thermometer* give a higher reading than the *dry*?

5. Explain the structure of the rain guage in use at Canadian Stations. How is the quantity of water in the form of snow ascertained?

6. Explain the origin of Cyclones and Anticyclones.

(i) Where in the cyclone is the barometric depression greatest and the wind highest?

(ii) What condition of temperature and cloud is connected with the wind?

(iii) Does the wind blow along the isobars with the same pressure on both sides of its course?

(iiii) State the relation that exists between the velocity of the wind, and the height of the barometer. What is a gradient?

7. State the results of comparing barometric observations by the Synchronous method.

8. Summarize the following observations:

EASTER EXAMINATIONS, 1883.—Continued.

		Bar.	Max. T.	Min. T.	Ther.	Rain.	Snow.
1.	7 a.m.	28.145	——— degrees.	——— degrees.	24.6 degrees.	2.05	5.6
	2 p.m.	29.378	———	———	43.4 "	——	——
	9 p.m.	29.143	45.3	7.6	27.8 "	——	——
2.	7 a.m.	29.423	———	———	—5.8 "	——	3.1
	2 p.m.	28.861	———	———	6.3 "	——	——
	9 p.m.	30.016	26.5	—8.4	—7.4 "	——	——
3.	7 a.m.	28.005	———	———	43.3 "	1.78	——
	2 p.m.	28.136	———	———	48.4 "	——	——
	9 p.m.	28.026	27.6	27.6	57.4 "	——	——
4.	7 a.m.	29.578	———	———	24.8 "	——	3.7
	2 p.m.	28.799	———	———	14.6 "	——	——
	9 p.m.	29.114	24.3	—9.7	—4.3 "	——	——

9. Read the instruments before you.

SECOND YEAR.

ENTOMOLOGY.

Examiner: J. Playfair McMurrich, M.A.

1. Describe the mouth parts of a Cockroach (*Blatta*).

2. Give the characters of the *Diptera*. Name the more important injurious insects belonging to the order.

3. What are the characters of the family *Chrysomelidæ*? Name the more important forms belonging to it, briefly stating the habits of each.

4. What plants are affected by the following forms? What remedies may be applied? *Coreus tristis, Leucarctia acræa, Lachnosterna fusca, Agrotis, Bruchus pisi?*

5. Give the life-history, classification, and remedies that may be applied to the Codling moth (*Carpocapsa pomonella*).

6. Describe the larva and imago of *Pieris rapæ*. What remedies may be applied for its destruction?

7. *Micropterus leucopterus*. Describe its habits and appearance.

8. Mention and classify the principal insect forms injurious to the apple.

9. Identify the insects before you, stating the nature of the injury they cause.

EASTER EXAMINATIONS, 1883.—Continued.

SECOND YEAR.

PRACTICAL HORTICULTURE.

Examiner: JAMES FORSYTH.

1. Describe the various modes by which a stock of plants may be increased, state how varieties are obtained, and special ones perpetuated.

2. Name the parts of a perfect flower, and state what transformation takes place when a double flower is produced.

3. Give the natural orders of the following genera: Ageratum, Epiphyllum, Cyclamen, Dianthus, Coronilla, and Tradescantia.

4. Give the generic names of a plant illustrative of each of the following natural orders: Tabaceæ, Solonaceæ, Lamiaceæ, Onagraceæ, Polypodiaceæ, and Asclepidaceæ.

5. Make a selection of 10 half-hardy or bedding plants, giving the technical and common name of each.

6. Relate the differences in structure between endogenous and exogenous stems, and give three examples of each.

7. Describe shortly the usual methods of heating greenhouses, and give general rules for watering, ventilating, etc.

8. Name four of the insect pests troublesome in greenhouses, and state the best means of getting and keeping clear of them.

9. How are hot-beds constructed? State the principal benefits to be derived from them, and describe their management.

10. Identify the plants before you, giving the technical name, common name, and natural order of each. Describe the peculiarities of Nos. 2, 6, and 9.

SECOND YEAR.

THE PRINCIPLES AND PRACTICE OF VETERINARY MEDICINE AND SURGERY.

Examiner: F. C. GRENSIDE, V.S.

1. Give the symptoms, and treatment of Open Joint.

2. In what two ways is lameness shown? Give the general treatment of it.

3. State the differential symptoms of navicular disease, and splint.

4. Name the diseases of the foot of the horse, and give the treatment of Corns and Thrush.

5. Give a definition of Erysipelas, and the treatment of the Phlegmonous form.

6. Give the symptoms of Caries of the teeth, and Dentition Fever, and state at what ages the latter occurs.

7. Mention the diseases of the eye, and give the symptoms and treatment of Conjunctivitis (Simple ophthalmia).

8. Give the differential symptoms of Colic and Enteritis, and the treatment of the ormer.

9. Describe Osteo-Sarcoma, White Scours and Warbles in Cattle, and give the treatment of the two latter.

10. Mention the two most common diseases of the stomach of the Ox, and give their symptoms and treatment.

EASTER EXAMINATIONS, 1883.—Continued.

SECOND YEAR.

ENGLISH LITERATURE.

Examiner: S. C. SMOKE, B.A.

1.—*Julius Cæsar.*

1. By whom, and under what circumstances, were the following passages spoken:—

(*a*). His coward lips did from their colour fly.

(*b*). O world, thou wast the forest to this hart;
And this, indeed, O world, the heart of thee.

(*c*). . . . . Vexed I am
Of late with passions of some difference,
Conceptions only proper to myself,
Which give some soil, perhaps, to my behaviours.

2. Point out the figures of speech in extracts (*a*) and (*b*), and explain them fully.
3. Write a paraphrase of extract (*c*).
4. Remark upon peculiarities of construction in the following sentences:—

"There's two or three of us have seen strange sights."
"Three parts of him is ours already."
"There is tears for his love; joy for his fortune," etc.

Compare the use of the singular verb in these sentences with its use in such sentences as the following:—Thirty acres of my farm is woodland. Three dollars is the price of that book.

5. "*Friends* am I with you all, and love you all."

Write a note upon this use of the word *friends*.

6. "Our yoke and sufferance shows us womanish."

Distinguish *womanish* and *womanly*, *manish* and *manly*.

7. Indicate the pronunciation of *livelong*, *longlived*, *construe*, *Philippi*.
8. Mention any respects in which this play is not historically accurate.

2.—*Richard II.*

1. "The purest treasure mortal times afford
Is spotless reputation * * * ."

Continue this extract, and quote another passage of similar import from Shakespeare.

2. "Since we cannot atone you we shall see
Justice design the victor's chivalry."

Write a paraphrase of this.

3. "Edward's seven sons, whereof thyself art one,
Were as seven vials of his sacred blood,
Or seven fair branches springing from one root:
Some of those seven are dried by nature's course,
Some of those branches by the Destinies cut."

Explain this passage fully.

4. "We will ourself in person to this war."

EASTER EXAMINATIONS, 1883.—Continued.

Parse *we, will, ourself.* Distinguish *ourself* and *ourselves.*

5. Scan the following verses :

"The accuser and the accused freely speak,"
"In rage deep as the sea, hasty as fire."
"Complotted and contrived in this land."
"To plot, contrive, or complot any ill."

6. Quote from this play any passage you particularly admire, and say wherein its merit consists.

7. Give some account of the controversy as to the authorship of the plays of Shakespeare.

SECOND YEAR.

POLITICAL ECONOMY.

Examiner: W. A. Douglas, B. A.

1. The interest of producer and consumer are identical. In what way?

2. What are the factors that enter into the production of wealth? Name the share appropriated by each of these factors?

3. "There is a tendency to equality of interest." There is a tendency to emigrate. There is a tendency to obtain supplies from certain locations—to adopt the best implements, et cetera. Towards what and from what are men's acts tending in all these cases? Illustrate.

4. "We now begin to see that to increase the productiveness of labour is really the important thing for everybody." Name some commodities which labour cannot increase, but which may diminish.

5. "Man alone, no animal more helpless; man in society, no animal more powerful." State the causes of this difference.

6. Certain causes tend to extend the division of labour, others tend to diminish. Name these, distinguishing the former from the latter.

7. "There are no principles in trade." Discuss this.

8. "A camping party exhibits the same tendency to organization that is found in a vast populous country." Illustrate this.

9. Two men working together will accomplish more than two working separately. Name at least two ways in which this can be accomplished.

10. Is the tendency of society to greater dependence or to greater independence of individuals and nations on each other? Illustrate.

11. Name (1) the beneficial objects that may be accomplished by trades unions; (2) the mistakes they sometimes make.

12. Distinguish nominal and real wages. If the whole body of workmen wish to increase their real wages, on what must they encroach?

13. Name some of the methods of harmonizing the interests of Capitalists and Labourers.

14. Tenant or Mortgagor. Show in what way, if any, the one is more advantageously situated than the other.

EASTER EXAMINATIONS, 1883.—Continued.

15. Money. What its functions?
In what way gold is so suitable for money,
The English law of legal tender.

16. Credit cycles. Describe (1) its progress,
(2) its duration,
(3) dates of depression during this century.

SECOND YEAR.

MECHANICS.

Examiner: E. L. HUNT.

1. Define acceleration. A body starting from rest has been moving for six minutes, and has acquired a velocity of 40 miles an hour. What is the acceleration of the body in feet per second?

2. Explain the meaning of the terms:—mass, momentum, force, force of gravitation, and centre of gravity. Which has the greater momentum, a body weighing 97 lbs. and moving with a velocity of 3 feet per second, or one weighing 76 lbs. and moving with a velocity of 4 feet per second? How would you find practically the centre of gravity of a plane surface.

3. State and illustrate by means of examples Newton's three laws of motion.

4. Which is the greater work, raising a weight of 150 lbs. up a perpendicular height of 70 feet, or raising a weight of 130 lbs. up a perpendicular height of 82 feet?

5. In a system of pulleys, where each pulley hangs by a separate string, the number of pulleys is 4. What weight will be supported by a power of 8 lbs?

6. What is the greatest weight which can be supported by a power of 35 lbs. by means of a wheel and axle when the diameter of the wheel is 11 times that of the axle?
(b). Why is the labour of drawing a bucket of water out of a common well generally greater during the last part of the process than during the first?

7. "Fluids transmit pressure equally and in all directions." Explain. Name any machines where practical advantage is gained from this property of fluids. Draw a diagram of one.

8. In what respect would you alter a reservoir that the force of the water from the taps leading from it may be increased?

9. Explain by diagrams the working of the common pump and siphon.

SECOND YEAR.

LEVELLING AND DRAINING.

Examiner: E. L. HUNT.

1. By what means would you determine definitely whether your land would be benefitted by underdraining?

2. Enumerate, with brief explanations, the benefits arising from thorough drainage.

3. What is the best mode of draining a field where upland is traversed irregularly by low wet portions? Illustrate by diagram—
(b). What disadvantage from such a state of the ground?

EASTER EXAMINATIONS, 1883.—Continued.

4. Write concisely on "Depth and Distance apart of Drains."

5. How many years are required to repay the cost of draining by the increase of the crops?

6. Distinguish between the true and apparent level.

7. From the following table find the distance of A from E, and the height of one point above tne other :—

Distance of station—

No. 1,	from A	175	from B	190	Back observation		4.1	Fore observation		2.6
" 2,	" B	280	" C	265	"	"	3.7	"	"	5.8
" 3,	" C	495	" D	504	"	"	1.5	"	"	4.3
" 4,	" D	940	" E	930	"	"	7.6	"	"	9.4

SECOND YEAR.

BOOK-KEEPING.

Examiner: E. L. HUNT.

1. State clearly how you would keep account in your books of your own work, and that of your horses.

2. Would you debit Live Stock with feed at market price, or at cost of production? Give reasons for your answer. (*b*). How would you value the seed sown?

3. April 4, got plough repaired, 50c., and bought one pair of boots, $4.50. April 6, J. Thomson worked 4 days on wheat field, at $1 a day. April 10, sowed 11 bushels of wheat, for which I paid $1.30 per bushel. April 30, paid J. Thomson $12; also paid R. Smith (grocer) $30 on account. May 1, bought 9 bushels peas at 75c. per bushel, and paid J. Thomson $1.00 for sowing. May 12, sold for cash 34 lbs. butter at 17 cents per lb., and 14 dozen eggs at 11 cents a dozen; also bought bed-room furniture amounting to $12. May 20, blacksmith set wagon tire, $1, for which he took 4 dozen eggs at 11 cents a dozen, and 4 lbs. butter at 16 cents a lb. July 29, I worked 2 days with team and reaper on wheat field; F. White and J. Simpson each worked 2 days on same field at $1.75 a day each; and J. Thomson do, at $1 a day. August 24, paid $10 for threshing wheat. August 29, sold 75 bushels wheat at $1.08 per bushel, and got 5 bushels ground for family use. September 19, paid $1.75 for tickets for social. September 30, went to Toronto; travelling expenses $11.

(*a*). Enter each of the above in the Ledger accounts affected.
(*b*). Write a note with reference to last three, September 30.

SPECIAL CLASS.

LIVE STOCK.

Examiner: P. J. WOODS.

1. Name the three best breeds of pigs for our Canadian markets, giving reasons for your selection.

2. How should a pen be prepared for a sow about to pig?
(*a*) Describe treatment of a sow from time of service to weaning of young pigs.

EASTER EXAMINATIONS, 1883.—Continued.

3. Give treatment of a grade bull calf from birth till twelve months old. Mention time of castration.

4. Describe treatment of calf to be sold to butcher when six weeks old. Calf to remain with dam only two days after birth.

SPECIAL CLASS.

PRACTICAL EXAMINATION OF CATTLE.

Examiner: P. J. Woods.

1. Point out the prime parts of the steer before you—those from which a butcher would expect to realize a profit.

2. Is the question whether an animal is well "ribbed home" or not, a matter of consequence to the butcher, or only to the feeder? Give reasons for your answer.

3. State the special advantages which would result to a butcher from a steer that would measure as much, or nearly as much, from the hooks to the pin bones as from the back of the shoulder to the hooks.

II. PAPERS SET AT THE SESSIONAL EXAMINATIONS, JUNE, 1883.

FIRST YEAR.

AGRICULTURE.

Examiner: Wm. Brown.

1. Give the cropping rotation in use on this farm, and submit the principal reasons for its adoption.

2. Explain the whole position of a Root Crop in any rotation.

3. Describe the accompanying samples of barley.

4. Classify pastures, and indicate wherein lies the value of that called permanent.

5. Under what circumstances are Green Fodders of importance in farming?

6. A manure being "anything that tends to fertilize a soil," give a list of cases in illustration.

7. What are the effects of under-draining land?

FIRST YEAR.

GEOLOGY.

Examiner: R. B. Hare, Ph.D.

1. Explain the following divisions of Practical Geology:—*Lithology*, *Strategraphy*, *Palæontology*, and *Historical Geology*.

MIDSUMMER EXAMINATIONS, 1883.—Continued.

2. Give *crystallographic form* and *chemical composition* of the minerals, Quartz, *Orthoclas*, Pyroxene, Hornblende, Calcite, Apatite, and Magnetite.

(*i*). Classify the Feldspars *according* to their crystallization and according to their composition.

(*ii*). How would you distinguish Hornblende from Pyroxene?

(*iii*). How would you determine the minerals Magnetite, Hematite, and Limonite by the streak?

3. Classify rocks according to their origin, their predominant chemical ingredients, and their texture.

4. Give the Mineralogical and Chemical Composition of *Diorite*, Syenite, Granite, Hornblendic Schist, Clay Slate, and Quartzite. How do *Basic Pleutonic* Rocks differ from Acidic Pleutonic? Give examples of both.

5. What are the principal ingredients of Soils? *Explain* the *source* of each.

(*i*). *Illustrate* by chemical formulæ the transformation of Hornblendic Gneiss Rock into Soil by atmosphere and rain water.

(*ii*). *Explain* the relation that exists between the composition of a soil and its water-holding power, its capillary powers and its warmth.

6. Aqueous rocks are frequently *coloured*?

(*i*). What is the cause of the red, brown, and black colours?

(*ii*). Why do white sandstones sometimes alternate with reddish shales?

(*iii*). How does the Sulphide of Iron become a distinguishing mark of marine clays?

(*iiii*). Why are fossils *rare* in red rocks and abundant in gray and dark-coloured beds?

7. The whole geological history of the earth has been divided into periods:

(*i*). *Name* the *periods*, stating at the same time the class of animals and plants peculiar to each.

(*ii*). Briefly describe the rocks of the Laurentian and Huronian systems. Where are they distributed, and what are the metallic ores they bear?

*8. Define layer, stratum, formation, seam, joints and slaty cleavage, dip, strike, outcrop, anticline, syncline, fault, unconformability, and denudation.

*9. (*i*). How is the chronology of beds ascertained?

(*ii*). State the condition in which organic remains occur, also the more changes to which they are subject.

*10. Name the *Systems* into which the Palæozoic Period has been divided, and briefly *outline* the *Series* that occur in Ontario.

*11. (*i*). Where in the Dominion of Canada do Rocks of Carboniferous age *occur*?

(*ii*). What is the probable age of the Lignite *formation* of the Western Territories?

(*iii*). Name the formation in which the essential Petroleum area or oil district of Western Canada is situated.

*12. Describe the leading characteristics of the Pleistocene age.

(*i*). State the conditions under which the Boulder Clay, Leda Clay, and Saxicava Clay were formed.

(*ii*). Describe climate, physical changes, and fauna of the Post Glacial age.

13. Name and briefly describe the minerals, rocks, and fossils before you.

☞ The student will choose any two of the questions marked with an asterisk.

MIDSUMMER EXAMINATIONS, 1883.—Continued.

FIRST YEAR.

STRUCTURAL AND PHYSIOLOGICAL BOTANY.

Examiner: J. Playfair McMurrich, M. A.

1. Describe a typical vegetable cell. Mention some of the more common forms assumed by cells.

2. Describe the structure of a leaf.

3. Describe the structure of an ovule. What changes take place after fertilization?

4. Mention and describe the varieties of stems. Indicate the part played by each in the life of the plants.

5. Describe some of the provisions for the prevention of self-fertilization in plants.

6. Define the following terms:—(*a*) corymb, (*b*) caryopsis, (*c*) stipule, (*d*) carpel, (*e*) spadix and spathe.

7. Name the elements indispensable to plants. Whence are they obtained, and for what are they used?

8. Mention and describe the forces which cause ascent of the sap.

9. Describe the influence of Temperature upon plants. Give the maximum, optimum, and minimum temperatures for wheat.

FIRST YEAR.

MATERIA MEDICA.

Examiner: F. C. Grenside, V.S.

1. Explain the difference between the physiological and therapeutic, actions of medicines.

2. Explain the antipathic and allopathic modes of cure.

3. What is meant by a diuretic, a purgative, and an anesthetic, and give an example of each.

4. How are tinctures, extracts, infusions and decoctions prepared?

5. Give the symbols for a drachm and a-half, an ounce, a minim, a pint, and three gallons.

6. What is aloes? Give the most important varieties, and actions, and doses for the horse.

7. Mention the different preparations of Ammonia, and give all the names by which each is known.

8. Give a prescription for diarrhœa.

9. Give a prescription for a good anodyne collyrium.

10. Mention the actions, uses, and doses of Chloral Hydrate.

MIDSUMMER EXAMINATIONS, 1883.—Continued.

FIRST YEAR.

ENGLISH LITERATURE.

Examiner: E. L. HUNT.

1. What is the general character of each sketch?

2. Where is Westminster Abbey? Whence its name?

3. Is there any fact or description in this sketch that shows the age of the building?

4. "I passed some time in Poets' Corner."

   (*a*). What does Irving say of "Poet's Corner?"

   (*b*). When did the tombs of "Poet's Corner" begin? What historical inference?

   (*c*). "Westminster Abbey is petrified history." Explain and illustrate.

5. "It was the tomb of a Crusader." Describe the tomb. Write a brief explanitory note on "Crusader."

6. What moral does Irving draw from the sepulchres of Elizabeth and Mary? Which does he favour? Criticise briefly.

7. "Death is robbed of its oblivion when the corpse is laid in the Abbey." Compare or contrast this sentiment with the thoughts awakened in Irving's mind by his visit to the Abbey. (*b*) An author's character is shown by his writings. What features of the author's character are exemplified in this sketch?

8. Name and describe the three leading characters of Sleepy Hollow.

9. When was this sketch written? Does Irving express a wish in this sketch which he realized later in life?

10. Give a synopsis of the story of Rip Van Winkle. (*b*) In your opinion what moral might this sketch point.

11. Quote four striking passages from the sketches read.

12. Locate the following:

   (*i*) "It was shuffled through, therefore, in form but coldly and unfeelingly." What was so shuffled through and why?

   (*ii*) "He evinced an hereditary disposition to attend to anything else but his business."

   (*iii*) "I will not attempt to detail the particulars of such a meeting where joy and sorrow were so completely blended."

   (*iv*) "A formidable birch-tree growing at one end of it." Is there anything mentioned later in the sketch which explains the meaning of formidable?

   (*v*) "It is neither to be chilled by selfishness, nor daunted by danger, nor weakened by worthlessness, nor stifled by ingratitude.

   (*vi*) "An insuperable aversion to all kinds of profitable labor." Meaning of 'profitable'?

   (*vii*) "A torrent of household eloquence."

   (*viii*) "A tart temper never mellows with age, and a sharp," etc. Complete the proverb.

   (*ix*) "He would rather starve on a penny than work for a pound."

MIDSUMMER EXAMINATIONS, 1883.—Continued.

FIRST YEAR.

COMPOSITION.

Examiner: JAMES MILLS, M.A.

1. Combine the following elements into a simple sentence :
   The robber was shot dead at the entrance to the cave.
   The cave ran far into the interior of the hill.
   The robber had spread terror in all directions.
   The robber was pursued by the king's troops.
   The troops were commanded by the king in person.

2. Substitute other and appropriate words in the following passage for those printed in *Italics* :—Towards *evening* Columbus *returned* to his *ships*, *accompanied* by *many* of the Islanders in their boats, which they *called* canoes, and which, though *rudely formed* out of the trunk of a *single* tree, they *rowed* with *surprising dexterity.*

3. Expand the following sentences, expressing the ideas in words and sentences of your own arrangement and construction :—" Without law there is no security, no abundance, no certain subsistence ; and the only equality in such a condition, is an equality of misery."

4. Write a composition on one of the following subjects :
   (*a*) The farmer's home, and what its surroundings should be.
   (*b*) Order and cleanliness.

FIRST YEAR.

MENSURATION.

Examiner: E. H. HUNT.

1. What will it cost to surround a circular grass plot whose diameter is 42 feet, with a gravel walk $3\frac{1}{2}$ feet wide, and costing 7 cents a square yard ?

2. (*a*). A bin is 6 feet 5 inches long, 4 feet 7 inches wide, and the grain in it 3 feet 9 inches deep. How many bushels are there ?
   (A gallon contains 277.274 cubic inches).
   (*b*). How many bushels, if 2 sides only are parallel, one 7 feet 7 inches and the other 4 feet 3 inches, the perpendicular distance between them 4 feet, and the grain 3 feet 9 inches deep ?

3. The diagonal of a square field is 14 chains. Find its area.

4. Find the solidity of a squared tapering log of wood, the breadth and thickness at one end being 33 and 22 inches respectively, and those of the other 27 and 18 inches, and length 40 feet.

5. Find both approximately and exactly the solidity of a piece of round timber, the girt at one end 16 feet and the other 12 feet ; length 26 feet, 6 inches.
   (*b*). If the timber did not taper regularly, how would you find the solidity.

6. The diameter of a cylindrical cistern is 12 feet. How deep must it be to contain 8,000 gallons ?

7. Which will carry off more water, a tile whose diameter is 6 inches, or three tiles, each having a diameter of 3 inches ?

MIDSUMMER EXAMINATIONS, 1883.—Continued.

8. How many cords of wood is in a pile 92 feet long, 8 feet wide, and 7 feet high?

9. A room is 20 feet 6 inches long, 15 feet 6 inches broad, and 16 feet high. Find the expense of covering the walls with paper 30 inches wide, at 7 cents a yard; allowing for 2 doors, each 8 feet by 3 feet 9 inches, one window 5 feet by 7 feet, two other windows each 5 feet by 4 feet, and a fire-place 4 feet 8 inches by 3 feet.

SECOND YEAR.

AGRICULTURAL AND LIVE STOCK.

Examiner: Wm. Brown.

1. What are the advantages and disadvantages of a variety of grasses and clovers in hay and pasture, by a rotation in cropping?

2. Apply your knowledge of Pastures and Green Fodders to the particular spring weather we have just had, showing wherein each has been prominent in any respect.

3. Give a brief criticism on the systems of Bare Fallowing, and Root Cultivation.

4. What do you consider first-class management of young Store Steers from April to October, with a view to profit and rapid results? Indicate the nature of the profits.

5. Give your opinion on the stamp of Hereford and Aberdeen Poll grade steers examined by you yesterday.

SECOND YEAR.

HORTICULTURE.

Examiner: J. Playfair McMurrich, M.A.

1. Discuss the question as to what kind of soil is most favourable for fruit growing.

2. How are varieties obtained in practice?

3. What natural forces tend to vary or preserve the characters of a species? How do they show themselves in practice?

4. What requisites are necessary for the success of a graft? Mention the more usually employed methods, briefly discussing the value of each.

5. Mention the different methods of hastening fruiting. Give the physiological reasons, and discuss the value of each.

SECOND YEAR.

SYSTEMATIC AND ECONOMIC BOTANY.

Examiner: J. Playfair McMurrich, M.A.

1. Name and characterize the reproductive processes of each group into which the old sub-kingdom *Cryptogamia* is divided.

2. Give a short description of the *Bacteria*. Name some diseases of which they are the cause.

3. Describe the life-history of *Claviceps purpurea*. Mention its uses, and any dangers which may result from its consumption.

MIDSUMMER EXAMINATIONS, 1883.—Continued.

4. Give the characters of the *Gymnospermæ*. Name, describe, and state the economic value of five plants of the order *Coniferæ*.

5. Give the characters of the *Gramineæ*. Describe the following genera, stating the comparative value of each :—*Phleum*, *Agrostis*, *Poa*, and *Festuca*.

6. Name the orders and genera to which the following plants belong :—Asparagus, Rice, Hop, Buckwheat, and Beet.

7. Characterize the order *Labiatæ*, and mention some of the useful plants belonging to it. On what does the economic value of the order depend?

8. Describe any flower you have analyzed.

SECOND YEAR.

ANALYTICAL CHEMISTRY.

Examiner : R. B. Hare, Ph. D.

Part I.—Lecture Room—Time 2 hours.

1. Distinguish *qualitative analysis* from *quantitative*, and analysis *in the dry way* from analysis *in the wet*.

2. Explain the terms :—Evaporation, precipitation, decantation, filtration, tests, reagents, and reactions.

3. Describe briefly the conditions under which metallic bases of more common occurrence may be divided into groups.

4. Separate and test the members of Group I. Formulate each reaction.

5. How would you separate in solution :

(*i*). Arsenic from tin.
(*ii*). Bismuth from copper.
(*iii*). Iron from aluminium.
(*iiii*). Barium from calcium.
(*iiiii*). Potassium from sodium.

6. Formulate the chemical action that occurs when—

(*i*). Potassium—ferrocyanide, ferricyanide, and sulphocyanide are introduced to solutions of iron salts.
(*ii*). Ammonium hydrate to solutions of Alum, Magnesium Sulphate, and Copper Nitrate.
(*iii*). Water to solutions of Bismuth Chloride and Antimonious Chloride.
(*iiii*). Yellow ammonium Sulphide to Sulphides of Arsenic, Antimony and Tin.

7. Give the distinguishing tests for the acids—Nitric, Hydrochloric, Sulphuric, Carbonic, and Phosphoric.

Part II.—Laboratory—Time 2 hours.

1. Determine the metals and acids present in *Solution No. 1.*
2. Which metal of Group I. is present in *Solution No. 2*?
3. Which metal of Group II. is present in *Solution No. 3*?
4. Which Metal of Group III. is present in *Solution No. 4*?
5. Which metal of Group V. is present in *Solution No. 5*?

☞ If the metal under examination forms two classes of Salts, state the *basic oxide* present and the acid with which it is united.

MIDSUMMER EXAMINATIONS, 1883.—Continued.

SECOND YEAR.

MATERIA MEDICA.

Examiner: F. C. GRENSIDE, V. S.

1. Give the other names for Hydrochloric Acid, and dose for the horse.

2. What is Iodine principally obtained from? Give its properties, actions and uses, and state in what disease it acts nearly as a specific.

3. Give a prescription for a good tonic and alterative ball containing Sulphate of Iron.

4. Give the different products of Flax and the uses of them.

5. State how to prepare a good purgative drench for the ox containing Sulphate of Magnesia, and name another medicine for which it is sometimes mistaken.

6. Give the tehnical terms for Corrosive Sublimate and Calomel, and state which is the most soluble.

7. Give the preparation and uses of Biniodide of Mercury.

8. Describe how to prepare Morphine for hypodermic injection, and give dose for this purpose for horse.

9. Give a prescription for Spasmodic and Flatulent Colic respectively.

10. Mention the products that are obtained by boiling wood-tar and turpentine.

SECOND YEAR.

VETERINARY OBSTETRICS.

Examiner: F. C. GRENSIDE, V. S.

1. Describe the coverings of the fœtus.

2. Describe the placenta of the mare, and state how it differs from that of ruminants.

3. Describe the symptoms of approaching parturition in the mare or cow.

4. What does the term embryotomy mean?

5. Describe the normal presentation of a fœtus.

6. Give a brief description of the instruments necessary in difficult parturition.

7. Describe how to tell the fore-legs from the hind ones of the fœtus when the knees and hocks cannot be reached.

8. State how to deliver an animal when the fœtus has one fore-leg completely retained.

SECOND YEAR.

ENGLISH LITERATURE.

Milton's L'Allegro and Il Penseroso.

Examiner: JAMES MILLS, M.A.

1. "Come, pensive nun, devout and pure,
Sober, stedfast, and demure;
All in a robe of darkest grain,
Flowing with majestic train;

MIDSUMMER EXAMINATIONS, 1883.—Continued.

And sable stole of cipres lawn,
Over thy decent shoulders drawn.
Come, but keep thy wonted state,
With even step and musing gait;
And looks commercing with the skies,
Thy rapt soul sitting in thine eyes:
There, held in holy passion still,
Forget thyself to marble, till,
With sad, leaden, downward cast,
Thou fix them on the earth as fast."

(*a*) Derive the words *pensive*, *nun*, *demure*, and *grain*.
(*b*) Explain the construction of *stole*, *looks*, *soul*, and *held*.
(*c*) "All in a robe of darkest grain." Parse the word *all*.
(*d*) *Train*—give the origin and common applications of this word.
(*e*) "Sable stole of cipres lawn." Give the meaning of *stole*, and write an explanatory note on *cipres lawn*.
(*f*) State exactly the meaning of *decent*, *commercing*, *rapt*, *there*, and *fast* in the above passage.
(*g*) "Forget thyself to marble." Comment on this expression and explain the meaning.
(*h*) Scan the first four lines of the extract.

2. Quote from L'Allegro and Il Penseroso.

(1) The introduction to each—"*Hence—dwell*," and "*Hence—train*";
(2) The different passages descriptive of music or its effects.

3. Write a short criticism of the two poems, illustrating your comments as far as possible by suitable quotations and references.

4. "Under the hawthorne in the dale." Explain why the poets prefer specific to generic terms.

5. *Landscape*—Give the origin and literal meaning of this word.

6. "By friar's lantern led"; "half regained Eurydice"; "Prince Memnon"; "the story of Cambuscan bold"; "presenting Thebes or Pelops' line."—Explain the allusions.

7. "Then to the well-trod stage anon,
If Jonson's learned sock be on;
Or sweetest Shakespeare, fancy's child,
Warble his native wood-notes wild."

Comment on this passage, noticing especially the appropriateness or inappropriateness of the words *learned*, *well-trod*, *sweetest*, *fancy's child*, and *native wood-notes wild*.

8. Name in order of time the four most distinguished Elizabethan authors, and write a note on the leading peculiarities of the period.

SECOND YEAR.

SURVEYING AND ROAD-MAKING.

Examiner: E. L. HUNT.

1. Describe (*a*) Gunter's chain, (*b*) the cross-staff. How would you determine its accuracy?

MIDSUMMER EXAMINATIONS, 1883.—Continued.

2. Draw a rough sketch of the field and find its area from the measurements given in the following field-book.

Left Offsets.	Chain-line.	Right Offsets.
	1842 to O_2	
784	1696	
	1364	478
590	1068	
	820	370
	From O_1	

3. Write fully on "what roads ought to be as to their slopes." What objection to a perfectly level road? What fraction of a load, which a horse can draw on a level road, can he draw on a slope of 1 in 24? On a slope of 1 in 10? Is this ratio constant?

4. Suppose a road is to be carried over a hill, which rises 100 feet in a horizontal distance of 500 feet. How would you avoid this steep slope if it was impracticable to go around it?

5. Describe the best and cheapest way of improving an earth road. In repairing such a road, what objection to filling in the ruts with stones? What advantage from frequent repairs?

6. What are the defects of river-side gravel as road material? The defects of pit gravel? What treatment should the latter receive before being used as a road covering? Should the larger stones be used for the lower layer of the road? Why, or why not?

7. (*a*) Enumerate the evil effects arising from having large stones on the surface of a road. What is the largest allowable size of the stones?

(*b*) Calculate the power required to draw a wheel, whose radius is 26 inches, over a stone 4 inches high, if the weight of the wheel and load on the axle together is 500 pounds. (The non-horizontal direction of the draught, and the thickness of the axle neglected).

III. PAPERS SET AT THE MATRICULATION EXAMINATIONS, APRIL, 1883.

ARITHMETIC.

Examiner: E. L. Hunt.

1. Simplify $\frac{2-\frac{1}{4}\times 64\frac{1}{9}}{4}+\frac{\frac{1}{2}(2+\frac{1}{5})}{12}+\frac{11\frac{3}{3\frac{1}{2}}}{3+\frac{1}{7}}$

2. Divide 468.3729 by 5.91246 to three decimal places.

3. A lends B $9,780 ; B repays A by giving him cattle to the amount of $1,946, a farm worth 4 times as much as the cattle, less $999, and the balance in cash ; how much cash did B pay A ?

4. A alone can do a piece of work in 8 days, B alone in 9 days, how long will it take both working together ?

5. Find the price of 13 tons, 15 cwt. 60 lbs. of hay at $17 a ton.

6. A cuts $\frac{1}{4}$ of a cord of wood in 1 hour, 40 minutes. How many days of 8 hours each will it take him to cut 186 cords, 88 feet ?

7. Of a field $\frac{1}{5}$ is meadow, $\frac{3}{8}$ is arable land, and the remainder is 1 acre, 3 roods, 26 poles. Find the quantities of meadow and arable land.

8. A, B and C can together do a piece of work in 20 days ; after 6 days A gives up, and is succeeded by D, who in one day does half as much again as A, B or C can do in a day. When will the work be finished ?

ENGLISH GRAMMAR.

Examiner: James Mills, M.A.

1. Write out the plural of *canto, lily, roof, Mussulman, father-in-law, phenomenon ;* and the feminine forms corresponding to *bridegroom, monk, wizard, stag, hart, cock-sparrow, and peacock.*

2. Explain and illustrate what is meant by *case, degree,* and *voice* in grammar.

3. Enumerate the moods in English, and state briefly the uses of each.

4. Divide the following passage into simple sentences, state the kind and connection of each sentence, and parse the italicised words :—

(*a*) "*There has* not *been* a better or more illustrious *man than Africanus.*"

(*b*) "The warm heart, the open hand, the free and *cordial* manner of the sailor-King, won the love of his people. He possessed *neither* brilliant genius, nor excellent wisdom, *but* strong sense guided *every* act of *his* useful *reign.*"

5. Correct the errors in the following sentences, giving reasons :

(*a*) "That isn't the way the last teacher learned us to do it."

(*b*) "One of our town sportsmen shot fifteen brace of partridge, along with a friend on Saturday afternoon last."

(*c*) He doesn't like those sort of questions.

(*d*) Please, sir, can I go out ?

(*e*) I fear we will be late for the train.

MATRICULATION EXAMINATIONS, 1883.—Continued.

GEOGRAPHY.

Examiner : JAMES MILLS, M.A.

1. Explain what is meant by the following terms in Geography :—*longitude*, *latitude*, *ecliptic*, *tropics*, *firth*, and *isthmus*.
2. Give the boundaries of Europe.

(*a*) Name in order from east to west the principal rivers flowing into the *Baltic Sea*, the *North Sea*, and the *English Channel*.¶

3. Name and locate the principal mountain ranges of Asia.
4. Give a list of the British possessions with brief notes as to tne position of each.
5. Name the Provinces of the Dominion of Canada ; give the name and position of the capital of each province ; and draw an outline map indicating the position of *Father Point*, *Three Rivers*, *Amherstburg*, *Windsor*, and *Sarnia*.
6. What and where are the following :—*May*, *Galveston*, *Assiniboine*, *Belle Isle*, *Sable*, *Sandy Hook*, *Falkland*, *Anglesey*, *Islay*, *Valentia*, *Sinope*, *Said*, *Mozambique ?*

COMPOSITION.

Examiner : R. B. HARE, PH.D.

Write a composition on one of the following subjects :—

(*a*) A description of your home and its surroundings.
(*b*) A letter to a friend, giving some account of your winter's work and amusements.
(*c*) The best indication of a man's tastes and character is the company he keeps

DICTATION AND READING.

Examiner : R. B. HARE, PH.D.

DICTATION.—Fourth Book, p. 117—"Trees . . . . . straight line."
READING.—Fourth Book, p. 117—"Immediately . . . . . can tell."

APPENDIX 4.

ONTARIO AGRICULTURAL COLLEGE.

CLASS LISTS.

I.—Easter Examinations, 1883.

II.—Midsummer Examinations, 1883.

I.—EASTER EXAMINATIONS, 1883.

FIRST YEAR.

CLASS.	CATTLE. (Written Exam.)	SHEEP. (Written Exam.)	HANDLING AND JUDGING CATTLE. (Oral Exam.)	HANDLING AND JUDGING SHEEP. (Oral Exam.)	INORGANIC CHEMISTRY.
HONOURS. I.	1 Ballantyne, A. W. 2 Little, W. 2 Carpenter, P. A. 4 McLennan, J. D. 5 Rose, G. M.	1 Sharman 1 Little 3 Ballantyne	1 Mathewson 2 Sharman 3 Black, C. H.		1 Lehmann 2 Slater 3 Macdonald
HONOURS. II.	1 Westlake, G. 2 Macdonald, W. A 2 Lehmann, A. 2 Black, P. C. 5 Soden, F. H. 5 Hubbard, W. W. 7 Sharman H. B. 7 McIntosh, G. H. 9 Saxton. E. A. 9 Wroughton, T. 10 Mathewson, G. 11 Steers, O. 13 Wark, A. E. 13 Slater, H. 15 Tucker, H. 15 Black, C. H. 17 McGregor, H. 18 Aylsworth, H. 18 Ardagh, A. E. 20 Fuller, S. G. 21 Hannah, J. 22 Edmondson, J. A. 23 Paton, G. C. 24 Miller, J. P. 24 Courbarron, F. H 26 Jones'Williams, A	1 Hubbard 1 Macdonald 3 Black, P. C. 4 Wroughton 4 Saxton 6 Miller 7 McIntosh 8 Paton 8 Black, C. H. 10 McGregor 11 Lehmann 12 Soden 13 Courbarron 13 Hamilton, J. B. 15 Mathewson 16 Rose 16 McLennan, J. D	1 Little, W. 1 Carpenter 3 McIntosh 4 Ballantyne 5 Keil 5 Macdonald 7 Hubbard 8 Hamilton, R. M 9 Powys 9 McGregor 11 Tucker 12 Westlake 13 Wark 14 Steers 14 Soden	1 Little 2 Lehmann 3 Ballantyne	1 Wark 2 Ballantyne 3 Little 4 Hubbard 5 Powys 6 Wroughton 7 Westlake 8 Miller 9 Tucker

CLASS LISTS (EASTER EXAMINATIONS)—*Continued.*

FIRST YEAR.

PASS.

III.

CATTLE. (Written Exam.)	SHEEP. (Written Exam.)	HANDLING AND JUDGING CATTLE. (Oral Exam.)	HANDLING AND JUDGING SHEEP. (Oral Exam.)	INORGANIC CHEMISTRY.
1 Powys, P. C.	1 Slater	1 Miller	1 Edmondson	1 Ardagh
1 Keil, C. A.	1 Carpenter	2 Rose	1 Hubbard	2 Carpenter
3 Erskine, H. R.	3 Fuller	3 Lehmann	3 Keil	3 Mathewson
3 Hamilton, J. B.	4 Wark	3 Black, P. C.	3 Rose	4 Courbarron
5 Braun, P. E.	5 Ardagh	5 Paton	5 Aylsworth	5 Edmondson
6 Mohr, A.	6 Latimer	6 Mohr	6 Black, C. H.	6 Mohr
6 Jordan, A. W.	7 Erskine	6 Edmondson	7 Black, P. C.	7 Steers
8 Shaw, A. G.	8 Keil	Aylsworth	8 Hannah	8 Rose
	9 Westlake	Ardagh	8 Wark	9 McIntosh
Black, D. A.	9 Powys	8 Hannah	10 Mathewson	10 Black, C. H.
Weatherston, D.	Jones' Williams	Slater	10 Wroughton	11 Keil
Hamilton, R. M.		Wroughton	Macdonald	
Shaw, E. E.	Aylsworth	13 Jones' Willia's	12 McGregor	Fuller
Latimer, R. M.	Braun	13 Erskine	Westlake	Jones' Williams
....	Black, D. A.	15 Courbarron	Carpenter	McGregor
.....	Edmondson	16 Braun	15 Erskine	Hamilton, R.M
.....	Hamilton, R. M.		15 Ham'ton, R.M	Jordan
.....	Jordan	Black, D. A.	Paton	Aylsworth
.....	Mohr	Fuller	Ardagh	Black, P. C.
.....	Shaw, E. E.	Hamilton, J. B,	19 Jones' Willia's	Braun
.....	Shaw, A. G.	Jordan	McIntosh	Black, D. A.
.....	Steers	Shaw, E. E.	Braun	Hamilton, J. B.
.....	Tucker	Shaw, A. G.	22 Fuller	Erskine
.....	Weatherston, D.	Weatherston	Sharman	Hannah
.....	.....	.....	25 Courbarron	Paton
.....	....	.....	25 Slater	Soden
.....	.....	.....	27 Miller	Sharman
.....	.....	.....		Shaw, E. E.
.....	.....	.....	Steers	Shaw, A. G.
.....	.....	.....	Soden	Weatherston, D
.....	.....	.....	Mohr	.....
.....	.....	.....	Powys	.....
.....	.....	.....	Hamilton, J. B.	.....
.....	.....	.....	Jordan	.....
.....	.....	.....	Tucker	.....
.....	.....	.....	Weatherston	.....
.....	.....	.....	Shaw, A. G.	.....
.....	.....	.....	Shaw. E. E.	.....
.....	.....	.....	Black, D. A.	.....
.....	.....	.....	.....	.....

Names unnumbered are those of students who failed to pass in the subject.

The minimum for first class honours is 75 per cent. ; for second class honours, 50 per cent. ; for pass 33 per cent.

CLASS LISTS (EASTER EXAMINATIONS)—*Continued.*

FIRST YEAR.

Class.	Organic Chemistry.	Physiology and Zoology.	Veterinary Anatomy.	English Literature.	Composition.
Honours. I.	1 Macdonald. 2 Slater. 3 Wark. 4 Lehmann. 5 Ballantyne. 6 Hubbard. 7 Carpenter.	1 Slater. 2 Carpenter. 3 McGregor. 4 Powys. 5 Black, P. C. 6 Tucker. 6 Macdonald.	1 Carpenter. 2 Lehmann. 3 Hubbard. 4 Saxton. 5 Slater. 6 Powys.	1 Powys. 2 Slater. 3 Carpenter. 4 Miller. 5 Tucker. 6 Macdonald.	1 Slater. 2 Powys. 3 Tucker. 4 Macdonald.
Honours. II.	1 McIntosh. 2 Powys. 3 Tucker. 4 Wroughton. 5 Miller. 6 Little. 7 Ardagh. 8 Westlake. 9 Black, C. H. 10 Black, P. C.	1 Lehmann. 2 Hubbard. 2 Soden. 4 Little. 5 Miller. 5 Steers. 7 Mathewson. 8 Black, C. H. 8 Ballantyne. 10 Paton. 11 Wroughton. 12 Ardagh. 13 Keil. 14 Wark. 15 Courbarron. 16 Shaw, E. E. 16 Edmonson.	1 Ballantyne. 2 Soden. 3 Rose. 4 Tucker. 4 Macdonald. 6 Little. 6 Black, C. H. 8 Mathewson. 9 Mohr. 9 Wroughton. 9 Miller. 12 Edmonson. 12 Westlake. 14 Black, P. C. 15 McGregor.	1 Wroughton. 2 McIntosh. 3 Hubbard, 3 Mathewson. 5 Black, P. C. 6 Saxton. 7 McGregor. 7 Lehmann. 9 Soden.	1 Carpenter. 2 Hubbard. 3 Black, P. C. 4 Miller. 5 Ballantyne. 6 Erskine. 7 Wroughton. 8 McGregor.

CLASS LISTS (EASTER EXAMINATIONS)—*Continued.*

FIRST YEAR.

CLASS.	ORGANIC CHEMISTRY.	PHYSIOLOGY AND ZOOLOGY.	VETERINARY ANATOMY.	ENGLISH LITERATURE.	COMPOSITION.
Pass. III.	1 Edmonson. 2 Paton. 3 Courbarron. 4 Fuller. Mohr. Steers. Mathewson. Hamilton R.M. Jones' Williams Rose. Keil. Aylsworth. Braun. Black, D. A. Hamilton, J.B. Erskine. Hannah. Jordan. McGregor Soden. Sharman. Shaw, E. E. Shaw, A. G. Weath'rston D.	1 McIntosh. 2 Sharman. 3 Fuller. 4 Westlake. 5 Mohr. 6 Hannah. 7 Rose. Jones' Williams Aylsworth. Jordan. Braun. Hamilton, R.M. Weath'rston, D. Hamilton, J.B. Erskine. Shaw, A. G. Black, D. A.	1 Hannah. 2 Ardagh. 3 McIntosh. Erskine. Steers. 6 Jones' Williams 7 Shaw, E. E. 8 Wark. 9 Keil. 10 Paton. Courbarron. 12 McLennan J.D. Jordan. Fuller. Braun. Shaw, A. G. Sharman. Aylsworth. Weatherston D. Hamilton, J. B. Hamilton, R.M. Black, D. A. Latimer.	1 Steers. 2 Shaw, E. E. 3 Keil. Courbarron. 5 Little. 6 Ardagh. 7 Paton. Erskine. 9 Edmonson. 10 Wark. Rose. Jones' Williams 13 Ballantyne. Westlake. 15 Black, C. H. Fuller. Hamilton, J. B. Aylsworth. Hannah. Weatherston, D. Shaw, A. G. Sharman. Mohr. Hamilton, R. M. Jordan. Braun. Black, D. A.	1 Courbarron. 2 Little. 3 Black, C. H. 4 Saxton. 5 Jones' Williams. 6 Ardagh. Soden. 8 Paton. 9 Wark. 10 Shaw E. E. 11 Mathewson. Fuller. 13 Sharman. 14 Shaw, A. G. Steers. 16 Lehmann. 17 Rose. 18 Westlake. 19 Keil. 20 McIntosh. Edmonson. Hamilton. J. B. Mohr. Weatherston. Black, D. A. Aylsworth. Hannah. Jordan. Hamilton, R. M. Braun.

☞Names unnumbered are those of students who failed to pass in the subject.

The minimum for first-class honors is 75 per cent.; for second-class honors, 50 per cent.; for pass 33 per cent.

CLASS LISTS (EASTER EXAMINATIONS)—*Continued.*

FIRST YEAR.

Class.	Arithmetic.	Book-Keeping.	General Proficiency.	Departments.	First-Class Men in the Departments.
HONOURS. I.	1 Lehmann. 2 Westlake. 3 Carpenter. 4 Powys. 5 Sharman. 6 McGregor. 7 Black, C. H. 8 Ballantyne. 9 Little. 10 Keil. 11 Macdonald.	1 Macdonald. 2 Sharman. 3 Little. 4 Westlake. 5 Lehmann. 6 Black, C. H. / Ballantyne. 8 Tucker. 9 Wark. / Ardagh. 11 Carpenter. / Mathewson. / Steers.	1 Macdonald. 2 Lehmann. 3 Carpenter. 4 Ballantyne. / Slater. 6 Little. 7 Hubbard. 8 Wroughton. 9 Black, C. H. 10 Wark. 11 Miller. / Westlake. 13 McIntosh. 14 Ardagh.	I. Agriculture and Live Stock.	None.
				II. Natural Science.	1 Slater, H. 2 Lehmann, A. 3 Macdonald, W. A.
II.	1 Wark. 2 Black, D. A. 3 Rose. 4 Wroughton. 5 McIntosh. 6 Ardagh. 7 Erskine. 8 Hannah. 9 Tucker.	1 McGregor. 2 McIntosh. 3 Wroughton. 4 Courbarron. 5 Keil. 6 Powys. 7 Black, P. C. 8 Miller.		III. Veterinary Science.	1 Carpenter, P. A. 2 Lehmann, A. 3 Hubbard, W. W. 4 Saxton, E. A. 5 Powys, P. C.
PASS. III.	1 Saxton. 2 Soden. 3 Aylsworth. / Miller. / Slater. 6 Hubbard. Fuller. Courbarron. Steers. Hamilton, R.M Shaw, A. G. Mohr. Shaw, E. E. Hamilton, J. B. Black, P. C. Mathewson. Weath'rston, D. Paton. Edmondson. Jones' Williams Braun. Jordan.	1 Paton. 2 Hannah. 3 Hubbard. 4 Rose. / Soden. 6 Edmondson. 7 Slater. 8 Aylsworth. Jones' Williams Braun. Jordan. Hamilton, R.M. Erskine. Mohr. Weath'rston, D. Fuller. Hamilton, J. B. Black, D. A.		IV. English Literature and Composition.	1 Slater, H. 2 Powys, P. C. 3 Tucker, H. V. 4 Carpenter, P. A. / Macdonald, W. C.
				V. Mathematics and Book-Keeping.	1 Westlake, G. 2 Sharman, H. B. 3 Lehmann, A. 4 Carpenter, P. A. 5 Black, C. H. 6 Little, W. 7 Macdonald, W. A. 8 Ballantyne, A. W. / McGregor, H. 10 Wark, A. E.

☞ Names unnumbered are those of Students who failed to pass in the subject.

Only those who passed in every subject are ranked in general proficiency.

First class men in any department must obtain at least 75 per cent. of the aggregate of marks allotted to the subjects in that department.

CLASS LISTS (EASTER EXAMINATIONS)—*Continued.*

SECOND YEAR.

Class.		Agriculture.	Arboriculture.	Live Stock. (Written Exam.)	Handling and Judging Sheep. (Oral Exam.)	Handling and Judging Cattle. (Oral Exam.)
HONOURS.	I.	1 Jeffs, H. B. 2 Creelman, J. A. 3 Robertson, W. 4 Willis, W. B. 4 Fotheringham, W. 6 McPherson, D.	1 Willis. 2 Torrance. 3 Creelman.	1 Jeffs. 2 Robertson. 3 Torrance. 4 Willis. 5 Garland. 5 McPherson.		1 Fotheringham.
	II.	1 Perry, D. E. 2 Torrance, W. J 2 Maunsell, G. S. 4 Garland, C. S. 5 Raynes, G. S. 5 White, C. D. 7 Gregory, J. 8 Smith, J. A. 9 Schwartz, J. 10 Holcroft, H. S. 11 McLennan, D. 12 Clark, C. 12 Smith, J. L. 12 Luton, E. E. 12 Tourangeau, A.	1 Raynes. 2 Perry. 3 Robertson. 3 McPherson. 3 Maunsell. 6 Garland. 7 Jeffs. 8 Holcroft. 9 Fotheringham. 9 Gregory.	1 Holcroft. 2 Perry. 3 Schwartz. 3 Smith, J. A. 5 Fotheringham. 6 Raynes. 7 Creelman. 7 Maunsell. 9 White. 10 Neilson. 11 Luton. 12 McLennan. 13 Clark. 13 Eddington.	1 Torrance. 2 Perry. 3 Maunsell. 4 Willis. 5 Creelman. 6 Fotheringham. 7 McPherson. 8 Robertson. 9 Jeffs. 10 Rennie.	1 McPherson. 2 Torrance. 3 Jeffs. 4 Robertson. 5 Willis. 6 Maunsell. 7 Perry. 8 Creelman.
PASS.	III.	1 Neilson, J. 2 Eddington, D. C	1 Rennie. 2 Smith, J. L. 3 Neilson. 4 Clark. 5 Schwartz. 5 Luton. 7 Tourangeau. 7 Eddington. White. Smith. McLennan.	1 Smith, J. L. 2 Tourangeau.	1 Luton. 2 Holcroft. 3 Schwartz. 4 Clark. 5 Eddington. 6 Raynes. 7 DeVeber. 8 Garland. 9 Neilson. 10 Smith, J. L. 11 Tourangeau.	1 DeVeber. 2 Eddington. 3 Raynes. 4 Garland. 5 Holcroft. 6 Rennie. 7 Luton. 8 Neilson. 9 Clark. 10 Tourangeau. 11 Schwartz. 12 Smith, J. L.

☞ Names unnumbered are those of students who failed to pass in the subject.

The minimum for first class honours is 75 per cent.; for second class honours, 50 per cent.; for pass, 33 per cent.

CLASS LISTS (EASTER EXAMINATIONS)—*Continued.*

SECOND YEAR.

Class.		Practical Horticulture.	Agricultural Chemistry.	Meteorology.	Entomology.	The Principles and Practice of Veterinary Medicine and Surgery.
HONOURS.	I.	1 Willis. 2 Fotheringham. 3 McPherson. 4 Robertson. 5 Jeffs.	1 Torrance. 2 Robertson. 3 Perry. 4 Willis. 5 Fotheringham. 6 Jeffs. 7 Schwartz.	1 Willis. 2 Torrance. 3 Robertson. 4 Perry. 5 Fotheringham. 6 Rennie. 7 Jeffs. 8 Gregory.	1 Robertson. 2 Jeffs. 3 Perry. 4 Torrance. Fotheringham.	1 McPherson. 2 Torrance. 3 Fotheringham.
	II.	1 Holcroft. 2 Neilson. 3 Torrance. 4 Perry. 5 Gregory. 6 Creelman. 7 Raynes. 8 Schwartz. 9 Maunsell.	1 Gregory. 2 McPherson. 3 Rennie. 4 Creelman.	1 McPherson. 2 Schwartz. 3 Holcroft. 4 Smith, J. L. 5 Clark, C. 6 Eddington.	1 Neilson. 2 Willis. Holcroft. 4 Clark, C.	1 Garland. 2 Robertson. 3 Jeffs. 4 Willis. 5 Holcroft. Perry. 7 Smith, J. A.
PASS.	III.	1 Eddington. Garland. 3 Tourangeau. 4 Clark. 5 Rennie. Luton. Smith, J. L.	1 Clark. 2 Holcroft. 3 Neilson. 4 Tourangeau. 5 Maunsell. 6 DeVeber. 7 Smith, J. L. 8 Raynes. Eddington. Garland. Luton.	1 Neilson. 2 Maunsell. 3 Tourangeau. 4 DeVeber. 5 Creelman. 6 Luton. 7 Garland. 8 Raynes.	1 Schwartz. 2 McPherson. Rennie. Garland. 5 Gregory. 6 Luton. 7 Creelman. 8 Maunsell. Smith, J. L. Tourangeau. DeVeber. Eddington. Raynes.	1 Raynes. 2 Tourangeau. 3 Schwartz. 4 Gregory. 5 Maunsell. White. Creelman. Neilson. Luton. Eddington. McLennan. Smith, J. L. Clark.

☞ Names unnumbered are those of students who failed to pass in the subject.

The minimum for first class honours is 75 per cent.; for second class honours, 50 per cent.; for pass, 33 per cent.

CLASS LISTS (EASTER EXAMINATIONS)—*Continued.*

SECOND YEAR.

Class.	Handling and Judging Horses. (Oral Exam.)	English Literature.	Composition.	Political Economy.	Mechanics.
HONOURS. I.		1 Fotheringham.	1 Fotheringham.		1 Jeffs.
		2 Eddington.	2 Willis.		2 Robertson.
		Willis.	3 Eddington.		3 Fotheringham.
		4 Robertson.			
HONOURS. II.	1 Fotheringham.	1 Torrance.	1 Torrance.	1 Clark.	1 Willis.
	Jeffs.	2 Perry.	2 Gregory.	2 Fotheringham.	2 Torrance.
	3 Maunsell.	3 Jeffs.	3 Jeffs.	3 Perry.	3 Perry.
	Raynes.		Robertson.	Willis.	
	Robertson.		5 Perry.	5 Robertson.	
	6 Perry.		6 Creelman.	6 Eddington.	
	Torrance.		7 Raynes.	Jeffs.	
	Willis.		8 Maunsell.	Rennie.	
	McLennan.		9 DeVeber.		
PASS. III.	1 Smith, J. L.	1 Clark, C.	1 Holcroft.	1 Garland.	1 McPherson.
	Eddington.	2 Gregory.	2 Rennie.	2 Torrance.	2 Schwartz.
	White.	Rennie.	3 Schwartz.	3 Schwartz.	3 Clark.
	4 Creelman.	Schwartz.	4 Smith, J. L.	4 McPherson.	Garland.
	5 Garland.	5 Creelman.	5 McPherson.	Creelman.	Holcroft.
	Tourangeau.	6 McPherson.	6 Clark.	Holcroft.	Smith, J. L.
	Rennie.	7 Raynes.	7 Neilson.	5 Maunsell.	
	8 McPherson.	8 Maunsell.	8 Garland.	Neilson.	Creelman.
	Smith, J. A.		9 Luton.	Smith, J. L.	DeVeber.
	Schwartz.	Holcroft.	10 Tourangeau.		Maunsell.
	Luton.	Luton.		Tourangeau.	Neilson.
	12 Neilson.	Smith, J. L.		Luton.	Eddington.
	Holcroft.	DeVeber.		Raynes.	Luton.
		Garland.			Rennie.
	Clark, C.	Neilson.			Tourangeau.
		Tourangeau.			Raynes.

☞ Names unnumbered are those of students who failed to pass in the subject.

The minimum for first class honours is 75 per cent. ; for second class honours, 50 per cent. ; for pass, 33 per cent.

CLASS LISTS (EASTER EXAMINATIONS)—*Continued.*

SECOND YEAR.

Class.		Levelling and Draining.	Book-Keeping.	General Proficiency.	Departments.		First Class Men in the Departments.
Honours.	I.	1 Willis. 2 Jeffs. 2 Robertson. 4 Torrance.	1 Gregory. 2 Rennie. 3 Torrance. 3 Willis. 5 Perry. 6 Fotheringham.	1 Torrance. 2 Robertson. 3 Fotheringham. 4 Willis. 5 Jeffs. 6 Perry. 7 McPherson. 8 Schwartz.	I.	Agriculture and Live Stock.	None.
					II.	Natural Science.	1 Torrance, W. J. 2 Robertson, W. 3 Fotheringham, W. 3 Perry, D. E. 5 Jeffs, H. B. 6 Willis, W. B.
	II.	1 Fotheringham. 2 Clark. 2 McPherson. 2 Perry. 5 Creelman.	1 Robertson. 2 DeVeber. 3 Schwartz. 4 McPherson. 4 Tourangeau. 4 Creelman. 4 Garland.		III.	Veterinary Science.	None.
					IV.	English Literature and Political Economy.	None.
Pass.	III.	1 Schwartz. 2 Holcroft. 3 Eddington. 3 Luton. 3 Maunsell. 3 Raynes. 3 Smith, J. L. DeVeber. Garland. Neilson. Tourangeau.	1 Eddington. 1 Jeffs. 1 Luton. 1 Smith, J. L. 1 Clark. 1 Raynes. Holcroft. Maunsell. Neilson.		V.	Mathematics and Book-Keeping.	1 Willis, W. B. 2 Robertson, W. 3 Torrance, W. J. 4 Fotheringham, W.

☞ Names unnumbered are those of students who failed to pass in the subject.

Only those who passed in every subject are ranked in general proficiency.

First class men in any department must obtain at least 75 per cent. of the marks allotted to the subjects in that department.

II.—MIDSUMMER EXAMINATIONS, 1883.

Class Lists.

FIRST YEAR.

Class.	Agriculture.	Geology.	Structural and Physiological Botany.	Materia Medica.	English Literature.
HONOURS. I.	1 M'donald, W. A. 2 Carpenter, P. A. 3 Ballantine, A. W	1 Macdonald. 2 Wark. 3 Carpenter. 4 Sharman. 5 Lehmann. 6 Ballantyne. 7 McKay.	1 Carpenter. 2 Lehmann. 3 Powys. 4 McKay. 5 Black, P. C. 6 Wark. 7 { Macdonald. { Hubbard.	1 Miller. 2 Carpenter. 3 Hubbard. 4 Wark. 5 Macdonald. 6 Butler. 7 Ballantyne. 8 Shaw, A. G. 9 Black, P. C.	1 Miller. 2 Black, P. C. 3 Carpenter. 4 Macdonald. ....
II.	1 Little, W. 2 McKay, J. B. 3 Hubbard, W. W 4 Sharman, H. B. 5 Black, P. C. 6 { Lehmann, A. { McGregor, J. 8 Ardagh, A. E. 9 Wark, A. E. 10 Miller, J. P. 11 Powys, P. C. 12 { Shaw, E. E. { Buckingham F 14 Black, D. A. 15 { Westlake, G { Courbarron, F. { H. { Jordan, A. W.	1 Wroughton. 2 Butler. 3 Little. 4 Hubbard. 5 Ardagh. 6 Powys. 7 Black, P. C.	1 Steers. 1 Miller. 3 Wroughton. 4 Ballantyne. 5 McGregor. 6 { Sharman. { Little. 8 Ardagh. 9 Hannah.	1 Wroughton. 2 Little. 3 Lehmann. 4 { Erskine. { Ardagh. 5 Courbarron. 7 { Powys. { Lane. { Sharman. 10 Shaw, E. E. 11 Braun. 12 Smith, E. P. 13 McGregor. 14 Steers. 15 { Wilson. { Mohr. 17 McKay.	1 McKay. 2 Powys. 3 Courbarron. 4 Wroughton. 5 Shaw, E. E. 6 Shaw, A. G. ....

The minimum for first-class honours is 75 per cent.; for second class honours, 50 per cent.; for pass 33 per cent.

CLASS LISTS (MIDSUMMER EXAMINATIONS)—*Continued.*

FIRST YEAR.

Class.	Agriculture.	Geology.	Structural and Physiological Botany.	Materia Medica.	English Literature.
PASS. III.	1 Braun, P. C. 2 Mohr, A. Steers, O. 4 Shaw, A. G. 5 Butler, G. C. Reford, F. W. 7 Keil, C. A. Wilson, T. G. 9 Corsan, G. H Annand, F. W. Lane, H. R. 12 Weatherst'n D Furner. 14 Smith, E. P. Macalister. Morris. Hannah. Erskine. Weath'rst'n, N.C Begbie. Watterworth and Brown.	1 Miller. 2 Westlake. 3 Wilson. 4 Mohr. 5 Hannah. 6 Shaw, E. E. 7 Keil. 8 Buckingham. 9 Courbarron. 10 McGregor. 11 Furner. Macalister. Smith, E. P. Steers. Shaw, A. G. Black, D. A. Braun. Fuller. Morris. Annand. Corsan. Begbie. Weatherston, D. Lane. Reford. Erskine. Weatherston, N. J. Watterworth.	1 Westlake. 2 Mohr. 3 Shaw, E. E. Lane. 5 Smith, E. P. 6 Butler. Courbarron. 8 Black, D. A. 9 Erskine. 10 Buckingham. 11 Macallister. Shaw, A. G. Jordan. Fuller. Weatherston, N. J. Braun. Begbie. Keil. Weatherston, D. Annand. Morris. Corsan. Wilson. Brown. Watterworth. Reford. Furner.	1 Westlake. 2 Hannah. 3 Macalister. 4 Corsan. 5 Weatherston. N. J. 6 Begbie. 7 Buckingham. Waterworth. Furner. Jordan. Keil. Morris. Weatherston, D. Annand. Reford. Brown. Black, P. C.	1 Steers. 2 Hubbard. 3 Ballantyne. 4 Butler. 5 Little. 6 Ardagh. Lane. 8 Sharman. 9 Wark. 10 Lehmann. 11 Wilson. Weath'rst'n, N.C 13 Hannah. 14 Erskine. 15 Furner. 16 Westlake. Keil. 18 Macalister. 19 Fuller. 20 McGregor. Watterworth. Begbie. Jordan. Annand. Buckingham. Smith, E. P. Mohr. Weatherston, D. Black, D. A. Brown. Braun. Corsan. Morris.

☞Names unnumbered are those of students who failed to pass in the subject.

The minimum for first-class honours is 75 per cent.; for second-class honours, 50 per cent.: for pass 33 per cent.

CLASS LISTS (MIDSUMMER EXAMINATIONS)—*Continued.*

FIRST YEAR.

CLASS.	ENGLISH COMPOSITION.	MENSURATION.	GENERAL PROFICIENCY.	DEPARTMENTS.	FIRST-CLASS MEN IN THE DEPARTMENTS.
HONOURS. I.	1 Hubbard. 2 Black, P. C. 3 Carpenter. Macdonald. 5 Courbarron. 6 Powys. 7 Miller. 8 Butler. 9 Shaw, E. E. 10 Wroughton.	1 Wark. 2 Little. 3 Sharman. 4 Carpenter. 5 McKay. 6 Ballantyne. 7 Wroughton. 8 Macdonald.	1 Carpenter. 2 Macdonald. 3 Wark. 4 Ballantyne. 5 Black, P. C. 6 Hubbard. 7 Miller. 8 McKay. 9 Wroughton. 10 Sharman. 11 Little. 12 Powys. 13 Lehmann. 14 Butler. 15 Ardagh. 16 Courbarron. 17 McGregor. 18 Westlake.	I. AGRICULTURE AND LIVE STOCK.	1 Macdonald, W.A. 2 Carpenter, P.A. 3 Ballantyne, A. W.
II.	1 McGregor. 2 Wark. 3 Sharman. 4 Ballantyne. 5 McKay. 6 Westlake. 7 Ardagh. Little. 9 Erskine. Lane. 11 Smith. 12 Begbie.	1 Westlake. 2 Powys. 3 Butler. 4 Hubbard. McGregor. 6 Erskine. 7 Black, P. C.		II. NATURAL SCIENCE.	1 Carpenter. 2 Lehmann, 3 Macdonald. 4 Wark. 5 McKay. 6 Ballantyne.
PASS. III.	1 Macalister. 2 Buckingham. Lehmann. Weatherston, N.C. 5 Hannah, 6 Shaw, A. G. Annand. 8 Wilson. 9 Fuller. 10 Watterworth. 11 Mohr. 12 Steers. 13 Black, D. A. 14 Corsan. 15 Furner. 16 Weatherston, D. 17 Braun. Keil. Brown. Jordan. Morris. Reford.	1 Lane. 2 Miller. 3 Courbarron. 4 Ardagh. 5 Buckingham. 6 Lehmann. Mohr. 8 Black, D. A. 9 Hannah. 10 Watterworth. 11 Keil. 12 Wilson. 13 Macalister, 14 Shaw. A. G. 15 Smith, E. P. Shaw, E. E. Steers. Morris. Furner. Annand. Jordan. Corsan. Weatherston, D. Braun. Fuller. Weatherston, N.C. Brown. Begbie.		III. VETERINARY SCIENCE. IV. ENGLISH LITERATURE AND COMPOSITION. V. MATHEMATICS AND BOOK-KEEPING.	1 Miller, J. P. 2 Carpenter, P.A. 3 Hubbard, W.W. 4 Wark, A. C. 5 Macdonald, W. A. 6 Butler, G. C. 7 Ballantyne, A. W. 8 Shaw, A. G. 9 Black, P.C. 1 Black, P. C. 2 Miller, P. C. 3 Carpenter, P. A. 4 Macdonald, W. A. 1 Wark, A. C. 2 Little, W. 3 Sharman, H. B. 4 Carpenter, P. A. 5 McKay, J. B. 6 Ballantyne, A. W. 7 Wroughton, T. 8 Macdonald, W. A.

☞ Names unnumbered are those of students who failed to pass in the subject.

Only those who passed in every subject are ranked in general proficiency.

First-class men in any department must obtain at least 75 per cent. of the marks allotted to the subject in that department.

CLASS LISTS (MIDSUMMER EXAMINATIONS)—*Continued.*

SECOND YEAR.

Class.	Agriculture and Live Stock. (Written Exam.)	Handling and Judging Cattle. (Oral Exam.)	Handling and Judging Sheep. (Oral Exam.)	Horticulture.	Systematic and Economic Botany.
HONOURS. I.	1 Jeffs, H. B. 2 Robertson, W. Willis, W. B. 4 Fotheringham, W. 5 Slater, H.	Jeffs. McPherson. Robertson. Willis.		1 Robertson. 2 Willis. 3 Jeffs. Fotheringham	1 Robertson. Slater. 2 Fotheringham.
HONOURS. II.	1 Garland, C. S. Holcroft, H. S. McPherson, D. Saxton, E. A. 5 Rennie, E. A. Austin, W. E. Luton, E. E. 8 Smith, J. L. 9 Mathewson, G. 10 Tauraugeau, A. Rose, G. M.	1 Luton. Fotheringham. 3 Saxton. 4 Austin. Mathewson. 6 Garland. Rennie. Schwartz. 9 Holcroft. Rose. Slater. 10 Eddington.	1 Fotheringham McPherson. Willis. 4 Eddington. Austin. Jeffs. Luton Robertson. Saxton. Garland. Mathewson. 12 Holcroft. Paton. Rennie. Schwartz.	1 Austin. 2 Slater. 3 Tucker. McPherson. 5 Saxton. 6 Rennie. Luton. 8 Schwartz. 9 Eddington. Paton.	1 Jeffs. 2 Willis. 3 Garland.
PASS. III.	1 Schwartz, J. A. Eddington, D. C. Tucker. Paton.	1 Paton. Tauraugeau. 3 Tucker.	1 Rose. 2 Slater. Smith. Tucker 5 Tauraugeau.	1 Tauraugeau. Rose. 3 Holcroft. 4 Smith. 5 Garland. 6 Mathewson.	1 McPherson. 2 Schwartz. 3 Tucker. 4 Austin. 5 Eddington. Tauraugeau. Rennie. Saxton. Luton. Mathewson. Holcroft. Paton. Smith. Rose.

☞ Names unnumbered are those of students who failed to pass in the subject.

The minimum for first-class honours is 75 per cent.; for second-class honours, 50 per cent.; for pass, 33 per cent.

CLASS LISTS (MIDSUMMER EXAMINATIONS)—*Continued.*

SECOND YEAR.

Class.	Analytical Chemistry.	Materia Medica.	Veterinary Obstetrics.	Handling and Judging Horses. (Oral Exam.)	English Literature.
HONOURS. I.	1 Slater. 2 McPherson. 3 Robertson. 4 Jeffs. 5 Willis.	1 Fotheringham. 2 Robertson. 3 Slater. 4 Jeffs.	1 Robertson.	1 Fotheringham. 2 Robertson. 3 { Willis. / McPherson. 5 Garland. 6 Holcroft. 7 Jeffs.	1 Robertson. 2 Slater. 3 Fotheringham. 4 Willis.
HONOURS. II.	1 Garland. 2 Fotheringham. 3 Saxton. 4 Schwartz.	1 { Willis. / McPherson. 3 Garland. 4 Rennie. 5 Schwartz. 6 Austin. 7 Mathewson.	1 Jeffs. 2 Fotheringham. 3 Slater. 4 Schwartz. 5 Willis. 6 Luton.	1 Schwartz.	1 Tucker. 2 Jeffs.
PASS. III.	1 Luton. 2 Paton. Rennie. Eddington. Holcroft. Austin. Rose. Smith. Taurangeau. Mathewson. Tucker.	1 { Taurangeau. / Tucker. 3 Holcroft. 4 Saxton. 5 Luton. 6 Paton. 7 Eddington. Smith. Rose.	1 Garland. 2 { Rennie. / Rose. 4 Tucker. 5 Taurangeau. 6 McPherson. 7 Mathewson. 8 Saxton. 9 Holcroft. 10 { Paton. / Eddington. 12 Austin. Smith.	1 Luton. 2 Taurangeau. 3 Smith. 4 Rennie. 5 Eddington. Only a portion of the class had the lectures necessary to pass this Examination.	1 Mathewson. 2 Eddington. 3 Paton. 4 Garland. 5 Schwartz. 6 { McPherson. / Rennie. 8 Saxton. 9 Austin. Taurangeau. Rose. Holcroft. Luton. Smith.

☞ Names unnumbered are those of Students who failed to pass in the subject.

The minimum for first-class honours is 75 per cent.; for second-class honours, 50 per cent.; for pass, 33 per cent.

CLASS LISTS (MIDSUMMER EXAMINATIONS)—*Continued.*

SECOND YEAR.

Class.		Surveying and Road-Making.	General Proficiency (Inside examinations)	General Proficiency (Outside examinations).
HONOURS.	I.	1 Willis. 2 Jeffs.	1 Robertson. 2 Willis. 3 Jeffs. 4 Fotheringham. 5 McPherson. 6 Schwartz. 7 Garland.	1 Robertson. 2 Jeffs. 3 Willis. 4 Fotheringham. 5 McPherson. 6 Schwartz. 7 Garland.
	II.	1 Robertson. 2 Austin. 3 Fotheringham. Slater. 5 Smith. 6 McPherson. Tucker.	.....	.....
PASS.	III.	1 Saxton. Luton. 3 Holcroft. Schwartz. 5 Rennie. 6 Paton. 7 Rose. Mathewson. Tourangeau. Garland. Eddington.	.....	.....

Departments.		First-class Men in the Departments.
I.	Agriculture.	1 Robertson, W. 2 Willis, W. B. Jeffs, H. B.
II.	Natural Science.	1 Slater, H. 2 Robertson, W. 3 Jeffs, H. B. 4 Willis, W. B.
III.	Veterinary Science.	1 Robertson, W. 2 Fotheringham, W. 3 Jeffs, H. B. 4 Slater, H.
IV.	English Literature.	1 Robertson, W. 2 Slater, H. 3 Fotheringham, W. 4 Willis, W. B.
V.	Mathematics.	1 Willis, W. B. 2 Jeffs, H. B.

☞Names unnumbered are those of students who failed to pass in the subject.

Only those who passed in every subject are ranked in general proficiency.

First-class men in any department must obtain at least 75 per cent. of the marks allotted to the subjects in that department.

APPENDIX 5.

FINANCIAL TABLES.

1.—Appropriation Expenditure for 1883.

2.—College Revenue for 1883.

3.—College Account with Farm and Garden for 1883.

4.—Estimated Expenditure for 1884.

ONTARIO AGRICULTURAL COLLEGE.

1. APPROPRIATION EXPENDITURE FOR 1883.

	$ c.	$ c.
A.—*Maintenance Account.*		
I.—*Salaries and Wages*	12,750 89	
II.—*Food.*		
Meat, fish and fowl	4,390 21	
Bread and biscuits	892 44	
Groceries, butter, and fruit	4,318 63	
III.—*Household Expenses.*		
Fuel	3,218 25	
Light	997 67	
Laundry, soap and cleaning	319 70	
Furniture and furnishings	863 73	
Repairs and alterations	887 72	
Women servants' wages	1,747 10	
IV.—*Business Department.*		
Advertising, printing, postage, and stationery	857 89	
V.—*Miscellaneous.*		
Maintenance of chemicals	199 92	
Library	285 01	
Unenumerated	761 70	
VI.—*Water for College and Farm* (city water works)	550 00	
		33,040 86
B.—*Capital Account.*		
I. Museum	719 76	
		719 76

2.—COLLEGE REVENUE FOR 1883.

	$ c.	$ c.
Tuition fees	3,092 11	
Balances on board accounts	4,109 50	
Supplemental examinations	40 86	
		7,242 47

3. COLLEGE ACCOUNT WITH FARM AND GARDEN FOR 1883.

DR.

	(a) With Farm.			
		$ c.	$ c.	$ c.
To Potatoes	413 bags	0 75	309 75	
" Milk	3,600 gallons	0 12	432 00	
" Flour	21⅔ barrels	4 75	103 28	
" Wood			45 00	
" Cartage for College			25 00	
" Keep of College horse			160 00	
" " Matron's horse, nine months			75 00	
				1090 03
	(b) With Garden.			
	January.			
To Cabbage	9½ dozen at	0 75	7 07	
" Beets	2½ bushels at	0 35	0 87	
" Carrots	4⅔ " "	0 25	1 18	
" Turnips	4¼ " "	0 20	0 85	
" Parsnips	4 " "	0 40	1 60	
" Celery	3½ dozen "	0 75	2 62	
				14 19
	February.		14 19	
To Turnips	5¼ bushels at	0 20	1 05	
" Cabbage	10½ dozen "	0 75	7 85	
" Carrots	5 bushels "	0 25	1 25	
" Celery	3½ dozen "	0 75	2 62	
" Parsnips	4 bushels "	0 40	1 60	
" Beets	1 " "	0 35	0 35	
				14 72
	March.		28 91	
To Parsnips	4 bushels at	0 40	1 60	
" Turnips	3½ " "	0 27	0 70	
" Carrots	5½ " "	0 25	1 37	
" Beets	3 " "	0 35	1 05	
" Onions	2 " "	1 00	2 00	
" Cabbage	6 dozen "	0 75	4 50	
				11 22
	April.		40 13	
To Parsnips	2 bushels at	0 40	0 80	
" Onions	1¼ " "	1 00	1 25	
" Turnips	3¾ " "	0 20	0 75	
" Carrots	2 " "	0 25	0 50	
" Beets	1½ " "	0 35	0 52	
" Cabbage	6 dozen "	0 75	4 50	
" Lettuce	¼ bushels "	3 00	0 75	
				9 07
	May.		49 20	
To Turnips	6 bushels at	0 20	1 20	
" Carrots	4 " "	0 25	1 00	
" Onions	2¼ " "	1 00	2 25	
" Beets	2 " "	0 35	0 70	
" Parsnips	5 " "	0 40	2 00	
" Rhubarb	6 " "	0 80	4 80	
" Lettuce	3½ " "	2 00	7 00	
" Cabbage	9½ dozen "	0 75	7 12	
" Radish	30 bunches "	0 05	1 50	
" Asparagus	180 " "	0 03	5 40	
				32 97
	June.		82 17	
To Rhubarb			11 41	
" Onions			1 10	
" Parsnips	3 bushels at	0 40	1 20	
" Lettuce			3 70	
" Turnips	6¾ bushels at	0 20	1 35	

3. COLLEGE ACCOUNT WITH FARM AND GARDEN FOR 1883,—*Continued.*

DR.

				$ c.	$ c.	$ c.
			June,—Continued.			
" Carrots	1	bushels at		0 25	0 25	
" Spinach	13	" "		0 50	6 75	
" Asparagus	504	bunches "		0 03	15 12	
" Parsley					0 52	
" Radish	3	" "		0 05	0 15	
						41 55
			July.		123 72	
To Spinach	12	bushels at		0 50	6 00	
" Rhubarb	8	" "		0 70	5 60	
" Lettuce	2¾	" "		0 50	1 75	
" Peas	12¼	" "		1 00	12 25	
" Beans	2½	" "		1 50	3 75	
" Potatoes	13¾	" "		1 25	16 56	
" Carrots	1	" "		0 35	0 35	
" Beets	½	" "		0 35	0 17	
" Onions	34	bunches "		0 05	1 70	
" Asparagus	156	" "		0 03	4 68	
" Parsley					0 23	
" Raspberries	166	boxes "		0 12	19 92	
" Mint	6	bunches "		0 05	0 30	
" Radish	12	" "		0 05	0 60	
" Strawberries	144	boxes "		0 07	10 08	
" Gooseberries	200	quarts "		0 10	20 00	
" White currants	24	" "		0 12	2 88	
" Red "	4	" "		0 12	0 48	
" Black "	20	" "		0 15	3 00	
						110 30
			August.		234 02	
To Potatoes	36½	bushels at		0 90	32 62	
" Peas	9	" "		0 80	7 20	
" Beans	2¾	" "		1 50	4 12	
" Beets	2¼	" "		0 40	0 90	
" Carrots	2	" "		0 30	0 60	
" Apples	7¼	" "		0 80	5 80	
" Lettuce	2	" "		0 40	0 80	
" Cucumbers					3 34	
" Rhubarb	2	bushels at		0 70	1 40	
" Parsley	5	bunches "		0 03	0 15	
" Onions	48	" "		0 05	2 40	
" Radish	6	" "		0 05	0 30	
" Mint	2	" "		0 05	0 10	
" Raspberries	252	boxes "		0 12	30 24	
" Black Currants	37	quarts "		0 15	5 55	
" Cabbage	3½	dozen "		0 75	2 62	
" Corn	24	" "		0 10	2 40	
" Vegetable Marrow	2½	" "		1 00	2 50	
						103 04
			September.		337 06	
To Potatoes	18½	bushels at		0 80	14 60	
" Onions	1¼	" "		0 80	1 00	
" Carrots	¾	" "		0 30	0 22	
" Apples	7¼	" "		0 80	5 80	
" Tomatoes	3½	" "		0 75	2 62	
" Beets	¾	" "		0 40	0 30	
" Turnips	¼	" "		0 20	0 05	
" Cabbage	6½	dozen "		0 75	5 62	
" Corn	83½	" "		0 10	8 35	
" Cauliflowers	17	" "		1 00	17 00	
" Vegetable Marrow	½	" "		1 00	0 50	
" Celery	1	" "		0 75	0 75	
" Parsley					0 26	
" Cucumbers					3 38	
						60 45
					397 61	

3. COLLEGE ACCOUNT WITH FARM AND GARDEN FOR 1883,—*Concluded.*

DR.

					$ c.	$ c.	
			October.				
To Apples	4⅓	bushels	at		0 80	3 60	
" Parsnips	4¼	"	"		0 40	1 70	
" Potatoes	21	"	"		0 80	16 80	
" Tomatoes	1	"	"		0 80	0 80	
" Onions	2½	"	"		0 90	2 25	
" Turnips	5	"	"		0 20	1 00	
" Beets	1	"	"		0 30	0 30	
" Salsify	¼	"	"		0 80	0 20	
" Cauliflower	15	dozen	"		1 00	15 00	
" Cabbage	10	"	"		0 75	7 50	
" Celery	30	"	"		0 75	22 12	
" Vegetable Marrow	8	"	"		1 00	8 00	
" White Radish	¾	bushel	"		0 60	0 45	
" Herbs	6	bunches	"		0 03	0 18	
" Carrots	2	bushels	"		0 25	0 50	
						478 01	80 40
			November.				
To Celery						26 24	
" Cabbage						5 99	
" Parsnips						4 37	
" Radish	¾	bushel	at		0 60	0 45	
" Herbs	6	bunches	"		0 03	0 18	
" Turnips	6	bushels	"		0 20	1 20	
" Carrots	7	"	"		0 25	1 75	
" Onions	7¾	"	"		0 90	6 97	
" Beets	2	"	"		0 30	0 60	
" Salsify	1½	"	"		0 80	1 20	
" Cauliflower	3	"	"		1 00	3 00	
" Cabbage, red	8	"	"		0 80	6 40	
" Savory, summer						0 10	
" Sage						0 10	
" Parsley						0 05	
" Mint						0 30	
						536 91	58 90
			December.				
To Celery	24½	dozen	at		0 75	18 37	
" Cabbage	7	"	"		0 75	5 25	
" Onions	11	bushels	"		0 90	9 90	
" Carrots	8½	"	"		0 25	2 12	
" Beets	2	"	"		0 30	0 60	
" Parsnips	3½	"	"		0 45	1 57	
" Turnips	3½	"	"		0 20	0 70	
" Radish, white	½	"	"		0 60	0 30	
" Salsify	3	"	"		0 80	2 40	
						578 02	1,678 05

CR.

By amount paid for work done by Students in outside departments	4,000 42	4,000 42
By balance		2,322 37

4. ESTIMATED EXPENDITURE FOR 1884.

COLLEGE AND BOARDING-HOUSE.	Voted for 1883.	Required for 1884.	
I.—Maintenance Account.			
(a) Salaries and Wages.			
	$ c.	$ c.	
President, Resident Master, Professor of English Literature and Political Economy	2,000 00	2,000 00	
Professor of Agriculture and Farm Superintendent	2,000 00	2,000 00	
Professor of Chemistry, Geology, and Mineralogy; Lecturer on Meteorology	1,500 00	1,500 00	
Professor of Biology and Horticulture; Lecturer on English Literature	1,300 00	1,500 00	
Professor of Veterinary Science	600 00	1,000 00	
Mathematical and Assistant Resident Master	750 00	800 00	
Instructor in Drill and Gymnastics	150 00	150 00	
Bursar	800 00	1,000 00	
Physician	300 00	300 00	
Matron and Housekeeper	400 00	400 00	
Engineer	600 00	700 00	
Assistant Engineer—6 months	198 00	210 00	
Stoker and Night Watchman—6 months	120 00	120 00	
Janitor, Messenger, and Librarian	180 00	240 00	
Temporary Assistance	100 00	100 00	
	10,998 00		12,020 00
(b) Expenses of Boarding-House.			
Meat, fish, and fowl	4,300 00	4,300 00	
Bread and biscuit	1,500 00	1,500 00	
Groceries, butter, and fruit	4,200 00	4,200 00	
Fuel	2,600 00	3,500 00	
Light	1,000 00	1,200 00	
Laundry, soap and cleaning	300 00	300 00	
Furniture and furnishing	550 00	550 00	
Repairs and alterations	650 00	650 00	
Women servants for Boarding-house, etc	1,750 00	1,870 00	
Advertising, printing, postage and stationery	600 00	600 00	
Maintenance of Chemicals	150 00	200 00	
Library, (books, papers, and periodicals)	200 00	250 00	
Unenumerated	700 00	700 00	19,820 00
	29,498 00		31,840 00
II.—Capital Account.			
Chemical apparatus		300 00	
Apparatus, etc., for Biological Department		300 00	
			600 00
Experimental Farm.			
Maintenance Account.			
Farm Foreman	600 00	1,000 00	
Garden Foreman	600 00	1,000 00	
Mechanical Foreman	600 00	1,000 00	
Experiments	4,500 00	3,000 00	
			6,000 00

APPENDIX 6.

ACT OF INCORPORATION.

As the Act of Incorporation passed by the Legislative Assembly of the Province of Ontario, on the 11th February, 1880, defines somewhat minutely the work of the College and the Farm, it is here quoted for the information of those who may wish to know the objects for which the Institution is maintained :—

No. 60.] BILL. [1880.

AN ACT RESPECTING THE AGRICULTURAL COLLEGE.

HER MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows :—

School of Agriculture continued. Site. Name.

1. The School of Agriculture, heretofore established in the county of Wellington, in this Province, for instruction in the theory and practice of agriculture, horticulture and arboriculture, and the conducting of experiments relating thereto, is hereby continued, at its present site, under the name of the "Ontario Agricultural College and Experimental Farm."

Nature of instruction.

2. The said college shall be furnished with all appliances, such as land, buildings, implements, tools and apparatus generally, as may be necessary for theoretical and practical education in agriculture, horticulture, and arboriculture, and the course of instruction therein shall be with reference to the following subjects :—

(1) The theory and practice of agriculture ;

(2) The theory and practice of horticulture ;

(3) The theory and practice of arboriculture ;

(4) The elements of the various sciences, especially chemistry (theoretical and practical), applicable to agriculture and horticulture ;

(5) The technical English and mathematical branches requisite for an intelligent and successful performance of the business of agriculture and horticulture ;

(6) The anatomy, physiology, and pathology, of the ordinary farm animals ; with the characteristics of the different varieties of each kind ; with the management thereof in the breeding, raising, fattening and marketing of each, and with a knowledge of the cheese and butter factory-systems ;

(7) The principles of construction and skilful use of the different varieties of buildings, fences, drainage systems, and other permanent improvements, machinery, implements, tools and appliances necessary in agricultural and horticultural pursuits ;

(8) And such other subjects as will promote a knowledge of the theory and practice of agriculture, horticulture and arboriculture.

Practical education insisted upon.

3. The education and instruction shall be at once theoretical and practical the former known as a course of study, and the latter as a course of apprenticeship : and a time, not less than three and not more than five hours daily, on a yearly average, shall be spent in undergoing the latter, and for the en-

couragement of such labours, an allowance in part-liquidation of expenses, may be made; yet notwithstanding, the course of apprenticeship may be dispensed with, if a satisfactory examination be previously passed in all the operations therein required.

Nature of experiments.

4. Experiments with the different varieties of cereals, grasses and roots; of trees, plants, shrubs, flowers, and fruits; with different modes of cultivation; with different manures; with the breeding, raising and fattening of animals; with the products of the dairy; and with whatsoever else may be of practical benefit in adding to the knowledge of the facts, principles and laws of the science and art of agriculture, horticulture, and arboriculture under the climatic conditions of this Province, shall be carried out on the experimental farm; and the modes of procedure and results published from time to time.

Publication of procedure and results.

Rules, regulations and curriculum of the college.

5. The government of the college shall be under and according to such rules and regulations as the Lieutenant-Governor in Council may from time to time prescribe; and such rules and regulations shall contain provisions for the standard and mode of admission, the course of study, and apprenticeship in each branch in which instruction is given, and may authorize diplomas, certificates of proficiency, scholarship or other rewards to be given, after examination, in any of such subjects; and may also impose reasonable fees for attendance.

Appointments to be made by the Lieutenant-Governor in Council.

6. The Lieutenant-Governor in Council may from time to time appoint a president and such professors, instructors, officers, assistants and servants as the Lieutenant-Governor in Council may deem necessary for the efficient working of said college, and the promotion of its usefulness, and may pass by-laws regulating and prescribing their respective duties.

Sessions, terms and vacations.

7. There shall be two sessions in each year, and two terms in each session; the winter session shall open on the first day of October, and close on the thirty-first day of March; the summer session shall open on the sixteenth day of April, and close on the thirty-first day of August; and the time between the closing and opening of the respective sessions shall constitute the regular vacations.

Affiliation of the college with the University of Toronto.

8. The Lieutenant-Governor in Council may agree with the University of Toronto for the affiliation of the said college with the said university, but only to the extent of enabling the students of the said college to obtain at the examinations of the said university such rewards, honours, standing, scholarships, diplomas and degrees in agriculture as the said university, under its statutes and the Acts of the Legislature in that behalf, may be allowed to confer.

Museum and laboratory.

9. In connection with the college there shall be a museum of agriculture and horticulture, together with the scientific and technical branches relating thereto, in order to afford aids to practical instruction, and illustrations of the agricultural and horticultural products of the Province; as well as a botanical and chemical laboratory to which vendors of seeds and artificial manures, may send such seeds and manures, in order that after the proper inspection and tests their purity and strength may be reported for the benefit and protection of the agricultural community.

Gifts, bequests, etc., to college, museum or laboratory.

10. It shall be lawful for the Lieutenant-Governor in Council on behalf of the Province to accept, hold and enjoy any gifts, bequests, or devises of personal or real property or effects which any person may think fit to make for the purposes of the said college, museum or laboratory.

No religious test or profession required; but all facilities given for acquiring religious training.

11. The Lieutenant-Governor in Council may make such regulations as may be deemed expedient touching the conduct of the students, and their attendance on public worship in their respective churches or other places of religious worship, and respecting their religious instruction by their respective ministers, according to their respective forms of religious faith, and every facility shall be afforded for such purposes.

Reports and returns to the Legislative Assembly.

12. Full reports of the progress of the said college and farm shall be annually returned and submitted to the Legislative Assembly, which reports shall amongst other things, contain :—

(1) A tabular statement with the name and residence of each student attending in each session of the year, together with the name residence and occupation of the parent or guardian, the number of classes that each student attended, and his progress and efficiency therein ;

(2) A return of the professors, instructors and assistants, with a summary of the instruction given by each ;

(3) A copy of the examination papers used in the sessional examinations, and the results thereof ;

(4) A summary of the operations in the various departments of the farm ;

(5) A clear and succinct account of the modes of procedure and results of the various experiments carried on during the year ;

(6) A detailed statement of the income and expenditure of the college and farm for the year ;

(7) A copy of all rules and regulations made during the year by the Lieutenant-Governor in Council, regarding the standard and mode of admission, the course of study and the course of apprenticeship ;

(8) A comparative statement showing the progress of the college and farm from year to year.

APPENDIX 7.

CIRCULAR OF THE ONTARIO AGRICULTURAL COLLEGE FOR 1883.

STAFF.

College.

JAMES MILLS, M.A., President,
Professor of English Literature and Political Economy.

WILLIAM BROWN, C.E., P.L.S.,
Professor of Agriculture and Arboriculture.

R. B. HARE, B.A., Ph.D.,
Professor of Chemistry, and Lecturer on Geology and Meteorology.

J. P. PLAYFAIR MCMURRICH, B.A.,
Professor of Biology and Horticulture, and Lecturer on English.

F. C. GRENSIDE, V.S.,
Professor of Veterinary Science.

E. L. HUNT,
(Third year undergraduate, University of Toronto),
Assistant Resident and Mathematical Master.

A. T. DEACON,
Bursar.

Farm.

WILLIAM BROWN, C.E., P.L.S., Farm Superintendent.

P. J. WOODS, Farm Foreman.

JAMES FORSYTH, Foreman of the Horticultural Department.

JAMES MCINTOSH, Foreman of the Mechanical Department.

INTRODUCTION.

The Institution, known as the "Ontario Agricultural College and Experimental Farm," is situated about a mile to the south of the city of Guelph, in the centre of an extensive agricultural and noted stock-raising district, readily accessible by rail from all parts of the Province. The Farm consists of 550 acres, about 400 of which are cleared. It is composed of almost every variety of soil, and hence is well suited for the purpose for which it was selected.

Immediately upon taking possession, the Government appointed a Commission to enquire and report regarding "the manner of adapting the said farm and management and control thereof to the purpose of a Model and Experimental Farm." A few extracts from the Report of this Provincial Farm Commission will show clearly the basis upon which the Institution is at present established:—

"The objects of the institution should be—First, to give a thorough mastery of the practice and theory of husbandry to young men of the Province engaged in agricultural or horticultural pursuits, or intending to engage in such; and, second, to conduct experiments tending to the solution of questions of material interest to the agriculturists of the Province, and publish the results from time to time."

"That the Farm should be separated into five distinct departments, namely:-

1 Field Department.
2 Horticultural Department.
3 Live Stock Department.
4 Poultry, Bird and Bee Department.
5 Mechanical Department.

"All permanent improvements on the Farm should be carried out on a gradually developed system, and in such a manner as to exhibit and test the comparative values of the most approved methods of executing the several works; and to test the cost, convenience and durability, of the several appliances from time to time recommended for adoption on the farms of the Province."

In order to carry out the suggestions of the Provincial Farm Commission, the Government made such improvements on the residence found on the place as would best utilize it for present purposes. Accomodation was provided for about twenty-five pupils, a Principal and a Rector were appointed, and a foreman for each of the following departments engaged, viz:—

1 Farm Department.
2 Live Stock Department.
3 Horticultural Department.
4 Mechanical Department.

Work commenced on a small scale in May, 1874; but owing to a variety of causes, very little was accomplished during the first year and a-half. The country was scarcely prepared for such an institution; and some of the first appointments were unfortunate. Hence, for two or three years, it seemed very doubtful whether the College would survive the attacks of its enemies and the mistakes of its friends. At length, however, common sense prevailed, and success was assured.

The College buildings have been altered and enlarged from time to time till they have assumed the proportions indicated in the frontispiece of this circular; and many improvements have been made on the Farm. A considerable portion of it has been underdrained, suitable buildings have been provided, and a fair representation of stock secured —seven breeds of cattle, six of sheep, and three of pigs.

Terms of Admission.

1. Candidates for admission must not be less than sixteen years of age.
2. Must produce satisfactory certificates—
   (1) As to moral character.
   (2) As to physical health and strength.
   (3) As to their intention to follow Agriculture or Horticulture as an occupation.
3. Must pass the Matriculation Examination.
4. Must pay the tuition-fee and a deposit on account of board in advance.

Matriculation Examination, Certificates, etc.,

The subjects of examination for admission are as follows :

(*a*) Reading, writing and dictation.
(*b*) English grammar—parsing and analysis.
(*c*) Arithmetic—to the end of Simple Proportion.
(*d*) The outlines of General Geography, and the Geography of Canada.

Candidates for admission are required to present themselves for examination on the 16th of April or the first of October, at nine a.m., in the Lecture Room of the College.

First, Second and Third-Class Teachers; holders of Intermediate Certificates, or Certificates of entrance into the High Schools or Collegiate Institutes of Ontario; Graduates or Undergraduates of any University in Her Majesty's dominions, will be admitted on presentation of any such certificates or diplomas. Intending students who do not hold any such certificates or diplomas are advised to pass the examination for admission to some High School.

Candidates are advised to enter on the first of October; and none should leave before the end of the Spring Term in June.

Payments in Advance.

At the time of entrance—

1. Resident Candidates for the Regular Course :—

Tuition fee for one year	$20 00
Deposit on account of board	15 00
	$35 00

2. Non-Resident Candidates for the Regular Course :—

Tuition for one year	$50 00
Deposit on account of board	15 00
	$65 00

3. Resident Candidates for Special Class :—

Tuition fee for One Session	$20 00
Board for Fall Term	30 00
	$50 00

4. Non-Resident Candidates for Special Class :—

Tuition for One Session	$50 00
Board for Fall Term	30 00
	$80 00

After admission—

1. All Regular Students :—
   At the beginning of each term, except the Summer Term, deposit on account of board $15 00

At the commencement of the second year,	
Tuition Fee, if Resident	$20 00
Tuition Fee, if Non-Resident	50 00
	$70 00
2. Special Students :—	
Fifth January, Board for Winter Term	$30 00

At the Commencement of the Second Year, payments the same as at the time of Entrance.

☞ By the term non-Residents is meant all except those whose parents or guardians are ratepayers or *bona fide* residents of the Province of Ontario.

All the above payments must be made to the President of the College strictly in advance.

There is no refund of fees to students who leave for any cause other than sickness, nor to those who are dismissed for neglect of work or violation of rules.

No allowance is made on board bills for absence of less than one week's duration, nor in any case in which the absence is not shown to be unavoidable.

Residence, Labour, Board, Remuneration, etc.

It is desirable that all students should reside in the building. As, however, the city is distant but a mile and a half, students may board in it and attend lectures.

The number of hours of labour for regular students varies with the season of the year, from three and a half to five hours a day. In the months of July and August, when there are no lectures, the number is nine and a half hours a day.

Board, Lodging and light, with the washing of towels and bed linen, $2.25 to $2.50 a week.

Washing, thirty cents per dozen pieces.

Allowances for labour, four to ten cents an hour, according to its value as estimated by the Farm Superintendent and his foremen—in no case to exceed the charges for board and washing.

By this arrangement the cost of education is reduced to a minimum.

(1) The entire cost to an Ontario farmer's son, able and willing, with considerable experience in farm work, is $40 to $55 a year for *board, washing, and tuition.*

(1) To an Ontario student without any previous knowledge of farming, $50 to $65 a year for *board, washing, and tuition.*

(3) To non-residents, $70 to $100 a year for *board, washing, and tuition.*

Some students, by regularity and industry, succeed in cancelling almost their entire board accounts.

General Rules.

I. Students are required 1. To render cheerful and willing obedience to orders.

2. To conduct themselves in a gentlemanly and orderly manner at all times.

3. To avoid all noisy or boisterous conduct in or about the building.

4. To observe neatness of dress at prayers, meals and lectures, and tidiness in their rooms.

II. The following practices are absolutely forbidden :—1. Swearing, improper language, and gambling.

2. Use of intoxicating liquors, cards, or fire-arms.

3. Use of tobacco while on detail, in or about the buildings, or in any place except the smoking-room.

4. Entering domestic or private apartments without permission.

5. Absence without leave.

6. Cutting, marking, or in any way defacing the College buildings or furniture.

General Regulations.

1. All students who reside in the building are under the charge of the President, and are at all times responsible to him for their conduct.

2. A register is kept of the attendance of students at prayers, work and lectures.

3. All students must attend prayers regularly, unless exempted from doing so, in consequence of objections raised by their parents or guardians.

4. They are required to attend their respective places of worship every Sabbath forenoon.

5. No student is allowed to leave the Institution during the hours of duty without the permission of the President; nor after seven o'clock in the evening, without the permission of the President or the master in charge *pro tem.*

Students must not be off work or absent from lectures without first getting the consent of the President.

6. In order that there may be no interference with the regular duties of the Institution, the half of every Saturday is set apart as a holiday for recreation and private business.

7. Students must not invite friends or guests to the dining-hall, or to stay over night in the College, without first obtaining the consent of the President.

8. None but the regular boarders are, under any circumstances, to go to meals in the dining-hall or remain over night in the College without permission from the President.

9. Students are provided with everything in the shape of furniture, bedding, towels, etc., that may be requisite, but each is accountable for every such article placed at his disposal.

10. Every student damaging or breaking anything, is required to report the same, that the value of the repairs may be charged to his account.

11. The morning bell is rung at 6 a.m.; bell for breakfast, at 6.30 a.m.; farm bell, at 7 a.m; school bell at 9 a.m.; farm bell, at 12 noon; dinner, at 12.30 p.m.; farm bell at 1.30 p.m.; school bell at 2 p.m.; farm bell at 5.30 p.m; school bell, at 7 p. m.; bell for roll call and evening prayers, at 9 p.m.: lights out at 10 p.m.; doors closed at 10.30 p.m.

12. The President is authorized to make such additional regulations as may seem to him necessary for the discipline of the Institution, and to impose fines and other penalties for the infraction of rules and regulations.

13. No student whose moral conduct, industrial or intellectual progress, is unsatisfactory to the staff, will be allowed to remain at the Institution.

N. B. (1) It is the duty of the President to enforce the above rules and regulations.

(2) A copy of this circular will be sent to every candidate for admission; and an application thereafter will be taken as an agreement on his part to comply with all the above rules, regulations and prohibitions.

(3) In the case of occasional students who are of age and are their own guardians the President may, if he thinks proper, relax the rules regarding leave of absence and attendance at Church.

Course of Instruction.

The instruction given at the Institution is embraced under two heads: a Course of Study and a Course of Apprenticeship.

I.—Course of Study.

The Course of Study is one of two years, and embraces the following subjects:

FIRST YEAR.—SUBJECTS.

Agriculture.
Live Stock.
Inorganic Chemistry.
Organic Chemistry.
Veterinary Anatomy.
Veterinary Materia Medica.
Physiology.
Zoology.
Structural and Physiological Botany.
Geology and Physical Geography.
English Literature.
English Composition.
Bookkeeping.
Arithmetic.
Mensuration.

SECOND YEAR.—SUBJECTS.

Agriculture.
Arboriculture.
Live Stock.
Agricultural Chemistry.
Veterinary Pathology.
Veterinary Surgery and Practice.
Systematic and Economic Botany.
Entomology.
Meteorology.
English Literature.
Political Economy.
Bookkeeping.
Mechanics.
Levelling and Surveying.

Departments of Instruction.

Department I.—Agriculture.

Introduction: *history of agriculture*—ancient, mediæval, modern; *literature*—standard works, reports of societies, periodicals; *varieties of farming*—dairy stock, mixed.

Soils.—Origin, distribution, physical properties, and classification of soils.

Reclamation of Lands.—Forest clearing; stumping, stoning, fallowing, etc.

Preparation of the Land for Crops.—Ordinary operations of tillage—ploughing, harrowing, cultivating, rolling, subsoiling, levelling; general cultivation most appropriate for the various kinds of soil.

Succession of Crops.—Importance and necessity of rotation; principles thereof; rotations suitable for various soils; crops—root, forage, cereal—treated with reference thereto.

Cultivation of Crops.—The various crops; *cereals*—wheat, oats, barley, etc.; *leguminous*—peas, beans, etc.; *roots*—turnips, carrots, potatoes, etc.; *forage or herbage*—tares, lucerne, clovers, grasses, flax, hemp—cultivation most appropriate for each; *seeds*—purchasing, testing, preparing, changing; *sowing*—kind and quantity of seed—method of sowing; *after cultivation, harvesting, consumption*, or preparing for market; cost of production; laying land down to grass; management of grass and pasture land.

Improvement of Soils and Lands.—Improvements by thorough ordinary cultivation; subsoiling; *draining*—its value; principles; various methods of draining; cost; *manuring*—farm-yard manuring; application, uses and properties of artificial manures—lime, plaster, salt, bones, superphosphate, nitrate of soda, etc.; green manures.

Breeding, Rearing, and Feeding of Animals.—Horses suited for agricultural purposes; various breeds; breeding, feeding and general management; *cattle*—characteristics of the various breeds—Shorthorns, Herefords, Devons, Ayrshire, etc.; methods of breeding—cross-breeding; in-and-in breeding; pedigree system; rearing young stock; the fattening process; relation of food to increase; dairy management; butter and cheese management; the factory system; *sheep*—characteristics of various breeds; long wools,

medium wools, short wools; breeding and management of ewe flock; winter and spring feeding; rearing of lambs; relation of food to increase; wool—texture; quantity and quality; dipping and salving, etc.; *swine*—characteristics of the various breeds; breeding and management of sows; fattening; relation of food to increase; bacon curing.

Implements of the Farm.—Mechanical principles entering into their construction; ploughs, harrows, cultivators; other tillage implements; sowing machines; grass, seed and manure distributors; mowing and reaping machines; threshing and dressing machines; barn implements; waggons, sleighs, carts; straw cutters; turnip cutters and pulpers; implements used in stock feeding, etc.,

General Economy of the Farm.—Laying out a farm; formation and management of roads and lanes; *fences*—varieties, position, mode of construction, materials; movable fences; hurdles; *hedges*—varieties, methods of planting, after cultivation; *buildings*—dwellings, outbuildings, stables, barns, sheds; principles of construction; plans and specifications.

General Business of the Farm.—Capital necessary—value and price of land, stock, implements and improvements; value of all kinds of labour; making of inventories; keeping of stock and produce registers; *markets*—economical laws regulating them; customs affecting them; modes of buying and selling; common laws relating to agriculture; relation of agriculture to the other industries.

Arboriculture.—Application to the American continent; different kinds of trees; occurrence, habits, uses, values; value of timber as a crop; raising of tree from the seed bed; what part of the country should be planted; planting operations; transplanting large trees; enclosing and draining planted grounds; management of trees with a view to shelter and economy.

Miscellaneous Subjects.

Department II.—Natural Science.

Chemical Physics.—Matter, accessory and essential properties of matter; attraction, various kinds of attraction—cohesion, adhesion, capillary, electrical, and chemical; specific gravity; weights and measures; heat, measurement of heat, thermometers, pyrometers, specific and latent heat; sources, nature, and laws of light; spectrum analysis.

Inorganic Chemistry.—Scope of subject; elementary and compound substances; chemical affinity; symbols; nomenclature; combining properties by weight and by volume; atomic theory; atomicity of the most important elements, oxygen and hydrogen; water—its nature, functions, decomposition and impurities; nitrogen; the atmosphere—its composition, uses and impurities; ammonia—its sources and uses; nitric acid and its connection with plants; carbon; combustion; carbonic acid and its relation to the animal and vegetable kingdom; sulphur and its compounds; manufacture and uses of sulphuric acid; phosphorus; phosphoric acid and its importance in agriculture; chlorine—its bleaching properties; bromine; iodine; silicon, etc.

Organic Chemistry.—Construction of organic compounds; alcohols, aldehydes acids and their derivatives; formic, acetic, oxalic, tartaric, citric, lactic, malic, uric, and tannic acids. Constitution of oils and fats—saponification; sugars, starch, cellulose; albuminoids, or flesh formers, and their allies; essential oils, alkaloids—morphine and quinine; classification of organic compounds.

Agricultural Chemistry.—Connection between chemistry and agriculture; the various compounds which enter into the composition of the bodies of animals; the chemical changes which food undergoes during digestion; chemical changes which occur during the decomposition of the bodies of animals at death; the functions of animals and plants contrasted; food of plants, and whence derived; origin and nature of soils; causes of unproductiveness in soil, and how detected; composition of different plants in relation to the soils upon which they grow; rotation of crops; preservation.

development and renovation of soils; manures classified; the chemical action of manures on different soils; chemical theories in reference to the action of superphosphates, the action of lime in the decomposition of double silicates; feeding of animals; classification of foods; chemical results in the use of different foods; points necessary to be considered in order to obtain the full value of artificial and natural foods.

Practical and Analytical Chemistry.—Chemical manipulation, preparation of common gases and reagents; operations in analysis—solution, filtration, precipitation, evaporation, distillation, sublimation, ignition, and the use of the blow-pipe; testing of substances by reagents; impurities in water; adulteration in foods and artificial manures; injurious substances in soils.

Quantitative analysis of soils, manures, and farm produce.

Geology.—Connection between geology and agriculture; classification of rocks—their origin and mode of formation, changes which they have undergone after deposition; fossils—their origin, inferences from their presence in rocks; geological periods and the characteristics of each. Geology of Canada, with special reference to the nature and economic value of the rock deposits; glacial period and its influence in the formation of soil. Lectures illustrated by numerous diagrams and specimens.

Physical Geography.—Scope of the subject—earth's place in space, external and internal conditions, atmosphere, ocean, land; superficial configuration of Ontario; theory of springs; classification of lakes; zones of animal and vegetable life.

Meteorology.—Relation of meteorology to agriculture; composition and movements of the atmosphere; nature and manipulation of the barometer, its importance in forecasting the weather; temperature, description of the various instruments used in its measurement and how to use them; solar and terrestrial radiation; the influence of forests on climate; mists, fogs, clouds, rain, hail and snow; description of instruments used in measuring rain and snow fall; velocity and direction of wind, causes affecting climate; influence of climate on vegetation.

Structural and Physiological Botany.—Internal structure of plants—cells and vessels; structure and development of the external parts of plants—root, stem, leaf, flower, seed, fruit; physiology of cells and vessels—chlorophyll, starch, gum, sugar, crystals, etc.; movements of fluids in plants, respiration, nutrition, reproduction; hybridization; modes of propagation of *varieties* by grafting, budding, layering, and division; disease of plants—smut, rust, mildew, etc.

Systematic and Economic Botany.—Subject defined; principles considered in the classification of plants—plants classified; orders containing the plants of greatest importance to the agriculturist described; plants classified in regard to their economic value for food, medicine, fabrics, forage, timber, etc. The course illustrated by a large collection of well preserved plants.

Zoology.—Nature of life; vital force; difference between animals and plants; morphology and physiology; homology and analogy; definition of species; classification; subdivisions of the animal kingdom; characters of the classes and most important orders, etc.

Entomology.—Anatomy of insects; geographical distribution and classification of insects; metamorphosis of insects; insects injurious to vegetation, their habits and the best methods of checking and preventing their ravages—all illustrated by a good collection of specimens.

Human Physiology.—Evidences of life; elementary tissues, connective tissues, adipose tissue, cartilage, bone; alimentary system, teeth, salivary glands, stomach (structure and functions of), intestines, liver and pancreas; foods, digestion of an ordinary meal, dieting; respiratory system; ventilation; excretory system; functions and structure of the kidneys and skin; clothing; bathing; nervous system, general working of the system, structure and working of the brain, eye, ear, and other sense organs; locomotory system, structure and physiology of the muscles; walking; running; exercise; hygiene—draining, thirty-seven motive diseases, contamination of water, etc.

Department III.—Veterinary Science.

Anatomy and Physiology of the Domestic Animals.—Horse, ox, sheep, pig. Osseous system, muscular system, syndesmology, plantar system, odontology, digestive system, circulatory system, respiratory system, urinary system, nervous system, sensitive system, generative system, tegumental system.

Veterinary Pathology.—Osseous system—the nature, causes, symptoms, and treatment of the various diseases of bone, as splint, spavin, ringbone, etc.

Muscular system—nature, causes, symptoms, and treatment of flesh wounds, etc.

Syndesmology—nature, causes, symptoms, and treatment of bog spavin, curb, and other diseases of joints.

Plantar system—nature, causes, symptoms, and treatment of corns, sand crack, and other diseases of the foot.

Odontology—describing the diseases of the teeth; also the mode of determining the age of animals by the same.

Digestive system—nature, causes, symptoms, and treatment of spasmodic and flatulent colic, inflammation of the bowels, acute digestion, tympanitis in cattle, impaction of the rumen, and many other common diseases.

Circulatory system—describing the diseases of the heart and blood vessels.

Respiratory system—nature, causes, symptoms, and treatment of catarrh, nasal gleet, roaring, bronchitis, pleurisy, inflammation of the lungs, etc.

Urinal system—nature, causes, symptoms, and treatment of inflammation of the kidneys, etc.

Nervous system—nature, causes, symptoms, and treatment of lock-jaw, stringhalt, etc.

Sensitive system.—nature, causes, symptoms, and treatment of the diseases of the eye and ear.

Generative system.—nature, causes, symptoms and treatment of abortion, parturition, milk fever, etc.

Tegumental system—nature, causes, symptoms, and treatment of scratches, sallenders, mallenders, parasites, and other diseases of the skin.

Materia Medica.—The preparation, actions, uses, doses, of over one hundred of the principal medicines used in Veterinary practice.

Department IV.—English Literature, and Political Economy.

English.—History of the English language; its formation, and connection with other languages. The sentence, the paragraph, and the period; capitals and punctuation; style—its varieties and qualities; principal figures of speech defined and illustrated; accuracy, purity, propriety, clearness, precision, strength and grace; false syntax discussed and corrected; prose and poetic diction distinguished; standard and characteristics of taste; pleasures of the imagination, etc.

Frequent exercises in letter-writing and impromptu composition.

Committing to memory, and critical study of two of Shakespeare's plays, and of selections from Milton, Gray, Goldsmith, Cowper, and Scott.

Political Economy.—Utility; production of wealth; land, labour, capital; division of labour; distribution of wealth: wages; trades unions; co-operation; money; credit; credit cycles; functions of government; taxation, etc.

Department V.—Mathematics and Book-keeping.

Arithmetic.—Review of subject with special reference to farm accounts; tables of

weights and measures; interest, discount, stocks and partnership; equation of payments; alligation; exchange, etc.; mental arithmetic—calculations in simple rules, fractions, and compound rules.

Mensuration.—Mensuration of surfaces and solids, with special reference to the measurement of lumber, timber, earth, etc.

Statics.—Forces; the mechanical powers; friction; the steam engine; strength of materials; units of work, etc.

Dynamics.—Motion, forces producing motion, momentum, etc.

Hydraulics.—Transmission of pressure; the hydraulic press; specific gravity, density; pumps, siphons, etc.

Levelling and Surveying.—Fields surveyed with chain and cross-staff; heights and distances found by the theodolite.

Drainage.—General principles; discharging water-ways; how, where, and when to commence draining; depth of drains and distance apart; furrow drains; draining followed by other improvements; drainage implements; levelling.

Road-making.

Book-keeping.—Business forms and correspondence; general farm accounts; dairy, field, and garden accounts; laws relating to farming—deeds, mortgages, notes, etc.

II.—Course of Apprenticeship.

The students are daily distributed to each of the following departments:

1. The Live Stock Department.
2. The Field Department.
3. The Horticultural Department.
4. The Mechanical Department.
5. The Experimental Department.

They are taught the manner of performing the various operations in each department by the instructor or his assistants in that department; and being sent in rotation to each, it is expected that at the end of two years a thorough apprenticeship will have been served.

The instruction received in the class-room is, as far as possible, illustrated and exemplified in the fields, yards, and shops. The following may be taken as a few of the operations, in the performance of which apprenticeship is served.

Field Department.—Cleaning, harnessing and management of horses; ploughing, harrowing, cultivating, drilling, subsoiling; sowing, broadcast and by drill; planting, hoeing, and grubbing, haying, by scythe and mower; harvesting; threshing, winnowing, stoning, draining, levelling, measuring, stumping, etc.

Live Stock Department.—Cutting, pulping, steaming, mixing, feeding, cleaning, general management of cattle feeding, lambing, shearing, castration, dipping, salving, hurdling; general management of sheep feeding and general management of other stock.

Horticultural Department.—Digging, ploughing, raking, seeding, planting, hoeing, mowing, harvesting, storing; general management of vegetables, flowers and lawn. Pruning, grafting, budding, mulching; general management of an orchard. General management of propagating houses, green-houses, vinery, nursery, hedges, walks, and roads, etc.

Mechanical Department.—Planing, sawing, nailing, grooving, matching, morticing, framing and general use of commoner mechanical tools. Fencing, hurdle making, gate making, and general farm improvements. Repairs of all farm buildings, implements, machines, etc.

TERMS, SESSIONS, VACATIONS, AND EXAMINATIONS.

Terms and Sessions.—The Scholastic Year commences on the 1st of October, and ends on the 31st August. It is divided into two sessions, and each session into two terms, as follows:

FALL TERM—1st October to 22nd December,	*Winter Session.*
WINTER TERM—5th January to 31st March,	
SPRING TERM—17th April to 30th June,	*Summer Session.*
SUMMER TERM—1st July to 31st August,	

Lectures commence on the 1st October, and continue throughout the first three terms—from 1st of October to 30th of June. During that time all regular students have class-room work, and manual labour alternately—three hours a day being spent at the former, and from three and a half to five at the latter. To this are added five hours in two weeks for set-up drill and gymnastics, so that the daily routine of every student in the regular course, for nine months of the year, is—

LECTURES IN THE COLLEGE.—Three hours a day (excepting Saturday.)

MANUAL LABOUR OUTSIDE.—Three and a half to five hours a day.

STUDY IN ROOMS.—Two hours a day.

DRILL AND GYMNASTICS.—One hour a day (for five days of every alternate week.)

While the first year students are at lectures in the College, the second year students are employed outside. Those who go out to work in the forenoon, come in for lectures in the afternoon, and *vice versa*. Thus the theoretical work inside and the practical work outside go on simultaneously during the Fall, Winter, and Spring terms. The Summer Term (1st July to 31st August) is devoted entirely to work in the outside departments—the Farm, the Live Stock, the Garden, the Carpenter Shop, and Experiments.

Vacations.—There are three vacations in the year—the Christmas vacation (22nd Dec. to 5th Jan.), the Easter vacations (1st to 16th April), and the Summer vacation (1st to 30th September). The College boarding house is closed during the Easter and Summer vacations.

Examinations.—The examinations which every student is required to pass each year of the Course are three in number—one in December, on the work of the Fall Term; one at the end of March, on the work of the Fall and Winter Terms: and one at the end of June, on the work of the Spring Term. The last two embrace not only the class-room work, but also the handling and judging of live stock, and the various operations in the outside departments.

DIPLOMAS.

Diplomas admitting to the Status of "Associate of the Ontario Agricultural College," are granted to all students who comply with the following conditions:—

1. Complete the regular course of study and apprenticeship.

2. Pass satisfactorily all prescribed examinations, both on the subjects contained in the curriculum and on the work of apprenticeship.

3. Compose an acceptable Thesis on some subject in the Course of Study or connected therewith.

The subject or topic to be discussed in the Thesis must be selected and submitted for approval not later than the end of January in the second year.

All Theses must be neatly written on foolscap paper, and handed to the President not later than the 10th May.

MEDALS.

Three medals are offered for competition among the students of the second year, designated—

The Gold Medal,
The First Silver Medal,
The Second Silver Medal.

All second year students are eligible to compete for these medals, provided they continue regularly from the beginning to the end of the Course, without dropping out or missing any of the prescribed examinations.

In case of failure in First Year examinations, or in the Christmas examinations of the Second Year, the Faculty may grant Supplemental Examinations or entertain claims for an *ægrotat*, without interfering with the right to compete.

The competition is—

(1.) By written examinations at Easter on the class-room work of the Fall and Winter Terms.

(2.) By written examinations at the end of June on the class-room work of the Spring Term.

(3.) By practical examinations at the above dates on cattle, sheep, pigs, horses, and various operations taught or performed on the Farm, in the Garden, or in the Carpenter shop.

The minimum standard for the Gold Medal is 50 per cent. of the marks in each subject, and an aggregate of 75 per cent. of the total number of marks in all the subjects; for the Silver Medals, 50 per cent. in each subject and an aggregate of 67 per cent. in all the subjects.

General Remarks.

A few general remarks on the appliances and advantages possessed by the Institution for training young men for agricultural pursuits, may be given in conclusion.

Farm and Carpenter Shop.

The carpenter shop is provided with three or four benches and the tools necessary for plain work and general repairs.

The farm is being gradually laid out, cleaned and drained. The best and most approved farm implements and machinery are used. Seven breeds of cattle, six of sheep, and three of pigs are kept for the purposes of instruction. The monthly fairs and fat cattle shows in the city of Guelph, are occasionally visited and reported on by the students.

Experiments.

A portion of the farm has been laid out in small plots; and a series of experiments with cereals, roots, grasses, manures, and various modes of management is regularly and systematically carried on from year to year. Besides the field experiments, others in the feeding of live stock are made during the winter, to test the several breeds of animals and the comparative value of different kinds of feed.

Horticultural Department.

In this department there are three green houses, a four-acre kitchen garden, a vinery, a thirty-acre lawn, an arboretum, and a large variety of fruit and ornamental trees.

Veterinary Department.

The veterinary department has been fully organized and is doing good work. A complete skeleton of a horse and all the principal bones of ordinary farm animals have been

provided for the class-room. When an animal dies from disease or any other ailment, it is dissected, the cause or causes of death sought for and pointed out in presence of the classes. Thus the work is made as practical as possible.

Library, Reading-room, and Gymnasium.

The library contains over 4,000 volumes of choice reading on the different subjects embraced in the course of study, and a good selection of history, poetry, biography, and travels; the reading-room is furnished with thirty-five or forty of the leading papers and periodicals; and the gymnasium is provided with a horizontal bar, parallel bars, Indian clubs, dumb bells, bar-bells, and most of the other articles used in common gymnastic exercises.

Advantages of the Course.

Besides becoming fairly skilled in the work of a farm, the student takes part in the cultivation of a garden, and thus increases his knowledge and improves his taste in a very important direction. He also acquires skill in the use of tools, so that he is not only able afterwards to make his own repairs, but knows when such work is properly done. He sees for himself the effects of various rotations and different modes of cultivation, and becomes acquainted on the experimental ground, and in the class-room, with many varieties of grasses, grains, roots and manures. The different breeds of cattle, sheep and swine, of common use in Canada, become familiar to him from daily contact with them; and the excellencies and defects of each he learns by lectures in the class-room, and by reference in the yards. He is taught how to keep live stock registers, accounts of field cropping, and regular farm accounts. He becomes acquainted with the prices of stock, implements, produce, building and improvements, and is prepared to transact the *business* of a farm. He obtains in the Veterinary Department a knowledge of the structure and functions of farm animals, and the most approved methods of treating and preventing the ordinary diseases to which such animals are liable. The study of the relations of the plant, the soil, and the animal, to each other and to his profession, under the heads of Botany, Chemistry, etc., not only shows him the reasons for the rules of the best farm practice, and enables him afterwards to discover other such rules, but likewise forms in him habits of reasoning closely, systematically and correctly, which cannot fail in after life to make him a better citizen. And lastly, by this, as well as by the teaching in the class-room, by reading standard works in the library, and newspapers and periodicals in the reading-room, by contact with his fellow-students, and by discussion carried on with them in their Literary Society, his mind is sharpened and strengthened, his views widened, and his power of thinking and his ability to express his thoughts greatly increased. If the student be careless, thoughtless, or lazy, few of those advantages will be reaped; but if he be attentive, energetic and diligent, the majority of them will be secured.

JAMES MILLS,
President.

PART II.

REPORT

OF THE

PROFESSOR OF CHEMISTRY.

ONTARIO AGRICULTURAL COLLEGE,
GUELPH, 1883.

To the President of the Ontario Agricultural College :

DEAR SIR,—In last year's report we gave, in the language of Professor Panton, the size of the college laboratory, "the private room of the Professor of Veterinary Science capable of accommodating not more than six students at work." We further acknowledged your kindness in allowing us, for the use of the second year students in practical and analytical Chemistry, to erect two temporary working tables in the gymnasium, or old dining hall, and to furnish them with appropriate shelves for holding the necessary reagents, etc., etc.

Since the publication of that report you have not only made those temporary tables permanent, but have decided that the room be, for the present, devoted to the interest of Chemistry.

Immediately upon taking possession we sought to give development to Chemistry in every sense practical. Opposite the first table a platform was built and upon the platform a chemical table provided with a pneumatic trough, and the necessary drawers, etc., etc. At one end of the chemical table, against the wall, was erected a case furnished with Professor Richards' Filter Pump and Blast and a leaden trough with cold and hot water water-pipes, and at the other end, an air chamber for carrying off foul gases. By a convenient arrangement of the cases, new and old, and of the students' seats, we endeavoured not only to make the room answer for a lecture room, but for a laboratory in which practical work might be done in qualitative and quantitative Chemistry.

It was not until July of the year that the new laboratory became furnished with apparatus for doing quantitative work. Through the intercession of Professor Brown and yourself, an appeal was made to the Hon. Mr. Young, then Minister of Agriculture, for a grant of Three Hundred Dollars ($300.00) from the Experimental Department, to be applied in the purchase of the most necessary pieces of apparatus. The Hon. Mr. Young granted the request. By going to New York in person, we saved, on catalogue prices, considerably more than our travelling expenses. Among the apparatus purchased were:—A Superior Becker Agate Chemical Balance ; a set of 100 gramme weights ; Combustion Gas Furnace, 25 burners ; Professor Richards' Filter Pump with Blast ; Sprengel's Air Pump ; Eudiometers of Bunsen ; Hoffman's Apparatus for decomposing water ; Kipps' Sulphuretted Hydrogen Apparatus ; Schlozssing's Apparatus for determining Nitric Acid; Nöbel's Silt Apparatus ; Distilled water Apparatus; Liebig's Condensor; Burettes Pipettes, Porcelain Crucibles, Berlin and Meissen, Combustion Tubes, Bulb Tubes, Rubber Corks, Mercury Troughs, Specific Gravity Bottle, Desiccators, Platinum Dishes, and Trays, etc., etc. This apparatus, with a set of pure chemicals purchased at the same time, enable us, in a measure, both to do and teach quantitative analytical work.

This trip to New York for chemical apparatus was made to serve another purpose, viz., that of visiting the Agricultural Experiment Stations of Connecticut, New Jersey, and New York. We shall briefly review the work done by these stations during the past year, indicating at the same time their present standing and future prospects.

1. The Connecticut Agricultural Experiment Station located at New Haven. This Station was incorporated by the State General Assembly in 1877. It is managed by a State Board of Control. The Director, ex-officio, is Professor S. W. Johnson, the first chemist is Dr. E. H. Jenkins. Besides the lady clerk, who attends to the office, there are four assistant chemists. A gardener and his wife are in charge of the building and grounds.

At the time of our visit to the station—first week of July—the Director, Professor Johnson, was absent. Dr. Jenkins most cheerfully and interestingly made us acquainted with the peculiar arrangements and workings of his *well* furnished laboratory. Upon informing us that he was then conducting experiments in general, upon the testing methods of Agricultural Analysis, particularly those referring to nitrogen in some of its forms, and Reverted Phosphoric Acid, we felt assured that the Doctor, under such favorable circumstances, must speedily effect important changes in some of the old methods. He informed us that the relative value of California grown seeds, and of Eastern grown were then engaging his attention. The California seed, though lighter and smaller, seemed to retain its vitality longer. He further informed me that the work of the Station was almost wholly analytical, the examination and analysis of the Commercial Fertilizers of the State constituting the most important feature of the Station's work. Every person selling manure in the State, the retail price of which is ten dollars or more, must affix to every package of it, a printed statement certifying the number of net pounds of fertilizer in the package. He must also send to the Director of the Agricultural Experiment Station a glass jar containing not less than one pound of the fertilizer, accompanied by an affidavit that it is a fair average sample of it. He must further pay annually to the Director of the Station, an analysis fee of ten dollars for each of the fertilizing ingredients contained, or claimed to exist, in the fertilizer.

The Station makes two classes of analyses of fertilizers ; the first for the benefit of farmers, gardeners, and the public generally, the second for the private use of manufacturers and dealers. The first analyses are done gratuitously ; for the second, moderate rates are charged. During 1882 one hundred and fifty one (151) samples of fertilizers were analyzed. The ingredients of the fertilizers which are determined and valued are : Nitrogen, Phosphoric Acid and Potash.

The Nitrogen can occur in the form of *Organic Nitrogen*—albumen and fibrine of meat and blood—Urea and Hippuric Acid of urine, etc., etc., or in the form of ammonia and of nitric acid—the altered forms of organic nitrogen existing in the soil and manure heap. In commerce the ammonia occurs as sulphate of ammonia, and the nitric acid as nitrate of soda. 100 parts of steam dried blood will contain 11 parts of nitrogen. 100 parts pure Sulphate Ammonia will contain 21 parts of Nitrogen. 100 parts pure Nitrate of Soda will contain 16 parts of Nitrogen.

The Phosphoric Acid exists also in three forms :

(1) Soluble Phosphoric Acid—The characteristic ingredient of Superphosphates. It is formed by acting on insoluble phosphates with sulphuric acid. It is readily taken up by plants and distributed through the soil by rain.

(2) Reverted Phosphoric Acid—Phosphoric Acid once freely soluble in water, now insoluble—soluble in a strong solution of ammonium citrate. Crops readily assimilate it. It has a lower value than soluble Phosphoric Acid.

(3) Insoluble Phosphoric Acid—phosphates not freely soluble in water or ammonium citrate—Canada apatite, South Carolina rock phosphate, etc. "The phosphate of coarse raw bones is at first nearly insoluble in this sense, because of the animal matter of the bone which envelopes it, but when the latter decays in the soil, the phosphate remains in essentially the reverted form."

Potash signifies potassium oxide. "It is most costly in the form of sulphate, and cheapest in the shape of muriate or chloride."

To estimate the value of a fertilizer we must know the "trade values" of the elements

of the fertilizer. The trade values vary with the state of the market. "The average *trade values*, or cost in market per pound, of the ordinarily occurring forms of nitrogen, phosphoric acid and potash, as found in the Connecticut and New York markets, and employed by the Station during the last two years, have been as follows :—

TRADE VALUES FOR 1881 AND 1882.

	1881 Cents per lb	1882 Cents per lb
Nitrogen in Nitrates	26	26
do in Ammonia Salts	22½	22½
do in Peruvian Guano, fine steamed bone, dried and fine ground blood, meat and fish, superphosphate and special manures	20	24
do in coarse or moist blood, meat or tankage, in cotton seed, linseed and castor pomace	16	18
do in fine ground bone, horn and wool dust	15	17
do in fine medium bone	14	15
do in medium bone	13	14
do in coarse medium bone	12	13
do in coarse bone, horn shavings, hair and fish scraps	11	11
Phosphoric Acid soluble in water	12½	12½
do reverted and in Peruvian guano	9	9
do insoluble, in fine bone, fish guano and superphosphates	6	6
do in fine medium bone	5½	5½
do in medium bone	5	5
do in coarse medium bone	4½	4½
do in coarse bone, bone ash, and bone black	4	4
do in fine ground rock phosphate	3½	3
Potash in high grade sulphate	7½	7
in low grade sulphate and kainite	5½	5½
in muriate or potassium chloride	4½	5

To illustrate the important work the station is doing in estimating the value of the different fertilizers sold in the state, we shall refer to some of the analyses of fertilizers the station has made. Having by analysis determined the quantity of nitrogen in all three forms, of phosphoric acid in all three forms, and of the potash and chlorine, the value of a ton of the fertilizer can be estimated by multiplying the quantity of each element in the ton, by the trade value of each. We shall compare the value so estimated with the price asked for the fertilizer by the manufacturer. In the ammoniated superphosphate of lime of H. J. Baker and Bros., New York, the value estimated by the station exceeded the cost, eight dollars and twenty-three cents. A short list of like honest, liberal manufacturers follows. In Powell's Prepared Chemicals of Brown Chemical Co., Baltimore, the cost exceeded the valuation fifteen dollars and seventy-eight cents. A long list of like dishonest manufacturers follows. In the manufacture of special Fertilizers a similar division occurs. In the corn manure of Geo. B. Forrester, New York, the valuation exceeded the cost eight dollars and thirty-nine cents ; in Bradley's patent fertilizer for tobacco, the cost exceeded the valuation thirteen dollars and fifty-four cents. A farmer who purchases seven tons of such a manure suffers a loss of one hundred dollars.

The method of valuing bone manure is interesting. By passing a weighed sample of the bone through a system of four sieves, five grades of ground bone are distinguished. We give the dimensions and trade values of the five grades :—

Grade.	Dimensions.	1882. Estimated value per pound. Nitrogen.	Phos. Acid.
Fine	Smaller than $\frac{1}{50}$ inch.	17 cts.	6 cts.
Fine medium	Between $\frac{1}{50}$ and $\frac{1}{25}$ inch.	15 "	5½ "
Medium	" $\frac{1}{25}$ and $\frac{1}{12}$ inch.	14 "	5 "
Coarse medium	" $\frac{1}{12}$ and $\frac{1}{6}$ inch.	13 "	4½ "
Coarse	Larger than $\frac{1}{8}$ inch.	11 "	4 "

By applying this principle (which is founded on experience) to the ground bone of Preston & Son's, the cost exceeded valuation seventeen dollars and eighty-eight cents. In the manufacture and sale of nitrate of potash and soda, sulphate of ammonia, dried blood and tankage, cotton seed, fowl manure and potash salts, dishonesty has also been detected.

In answer to occasional inquiries made at the station with regard to the method of preparing superphosphate of lime, an explanation of the process of making it from bone charcoal is given. We have received similar inquiries from farmers of the Ottawa District about the method of preparing superphosphate of lime from the mineral phosphate. The only difference between the bone charcoal, or waste product of the factory, and the mineral phosphate is that the former is finely powdered, the latter is not. If the farmers of mineral phosphate districts will buy a "rock grinder," they may cheaply manufacture their own superphosphate of lime. Construct wooden vats after the style of a mortar bed; put 500 pounds of the ground phosphate into the vat, making a slight depression in the middle of the pile, pour fifteen gallons of water slowly over the mass, mixing with a hoe until the whole is wet; pour in the same way, keeping eyes averted and avoiding spattering as much as possible, 300 pounds of sulphuric acid over the heap. If a drop of the acid falls upon the skin immediately wipe it off with a cloth and wash the place well with water. Mix the materials thoroughly with a hoe until steaming and frothing have about ceased. In a short time the mortar consistency of the mixture will have dried to a crumbly state and may be spread on the land.

Attention has been called by the station to galvanized iron and tinned copper as a source of poison. Galvanized iron is sheet iron coated with zinc. The zinc dissolves in the juices of fruit or in vinegar. The soluble salts of zinc are ranked among poisons. "A little zinc dissolved in cider may produce no noticeable ill effects on a vigorous person. Large doses cause disturbance, more or less serious, of the digestive apparatus. Tinned copper can be a source of lead poison. The Connecticut station, needing a vessel of tinned copper for the storage of distilled water, had a tinsmith of New Haven make one. The copper was lined with a tin containing so much lead that "pure water dissolved it rapidly and carbonate of lead, in minute brilliant crystals, formed a film on the surface of the water and coated the sides of the vessel."

The station has further made between 200 and 300 complete or partial analyses of milk. By averaging the analyses, the following composition of the milk was obtained:—

Water	87·5
Fat	3·5
Casein and albumen	4.1
Milk sugar	4·3
Ash	0·6
	100·00

Solids, 12·5.

Water constitutes, on the average, seven-eights of the total milk, the valuable ingredients being included in the 12·5 per cent. solids which remain when the water is evaporated. We give the following brief description of the solids valuable as food:

"Butter is the fat of milk mixed with some ten or fifteen per cent, of water and one-half per cent. of the other solids of the milk, together with two-fifth per cent. of salt added in the making.

"Butter-milk is the water of milk, with most of the casein and sugar and a small amount of fat.

"Cheese is the casein and albumen of milk, with more or less of the fat and other solids and a variable amount of water.

"Whey is mostly the water of milk, with the larger share of the sugar and small portions of the other solids.

"The worth of milk, for common use as food, depends on the quantity of solids it contains. It is well established that genuine milk is somewhat variable in composition

as respects the proportions of water and solids. It is found that differences of breed, characteristics of the individual animals, period of lactation, quantity and kind of food, climate or weather, state of health and other conditions, which largely affect the quantity or yield of milk, also, though to a much less degree, influence its composition on the proportion of its ingredients."

In testing the quality of milk the *specific gravity test* and the test by chemical analyses are both in use. As the specific gravity of milk is diminished by adding water and increased by removing fat, watering and skimming, if artistically combined, can scarcely be detected by the lactometer. It has been found at the station that milk watered to any considerable extent has its specific gravity brought below 1·029, a reading clearly given by the lactometer. In case of double falsification, watering and skimming, the milk has been allowed to stand for cream or has been chemically analyzed. We give a brief summary of some of the analyses made :—

"Thirty analyses of the milk of twelve herds, about 180 head of cows, made in October, 1881, gave :

	Solids.	Fat.
Average	12·89	4·02
Maximum	14·28	5·14
Minimum	12·00	2·68

"Twenty-seven analyses of the milk of the *same herds*, made in July and August, 1882, gave :

	Solids.	Fat.
Average	12·21	4·23
Maximum	13·32	5.63
Minimum	11·02	3·47

"Seventy-seven analyses of the milk of sixty herds, in May, 1882, gave :

	Solids.	Fat.
Average	12·81	4·05
Maximum	14·44	5·23
Minimum	10·93	3·24

In this herd-milk the solids have varied between 14·4 and 9·8 per cent., and fat between 5·6 and 2·6 per cent. The variations in its specific gravity are less striking. "No instance appears to be on record where a competent observer has found for the mixed milk of a number of healthy cows a specific gravity less than 1·029, and we may conclude with certainty that milk which falls below that density has been watered." It is thought that specific gravity, as an evidence of watering simply, furnishes by far the most satisfactory test. If 1·029 be adopted as a minimum "no pure milk will be condemned."

"In more than 6,000 recorded observations on the mixed milk of herds Boachardat and Quevenne found that it was always between 1·029 and 1·033. Müller in Bern, from many hundred observations in Switzerland, France, Belgium, England, and other places, found the same limits. Fleischmann, in 833 samples of milk sold in Lindau, found only four per cent. which had a specific gravity of less than 1·029, and all of these, as he proved, were either from single cows or had been watered. In the reports of examinations, made by the police of European cities, of herd milk taken in the stables, it is possible to find specific gravities under 1·029, but in these cases there is no certainty or even probability that the determinations were made with sufficient care to avoid sources of error."

The station has made analyses of fodder corn and ensilage with the object of learning something of the kind and degree of chemical change which occurs in the silo. In comparing the analyses of duplicate samples of *fresh field corn*, a difference of 0·85 per cent. was noticed in the water content—partly due to unavoidable errors in sub-sampling, drying and weighing. Comparing, on water free substance, the composition of the ensilage with that of the corn itself no satisfactory evidence of any change in the albuminoids was discovered. "As regards the ether extracts, we observe that in both cases the ensilage contains very nearly double what was got from the fresh corn. In

ordinary fodder analyses the ether extract consists for the most part of oil, fat or wax, and is usually termed fat or crude fat. In the process of ensilage it is not so likely that fat is produced as that lactic acid is formed, perhaps mainly during the sampling and sending (by transformation of sugar), which dissolve freely in ether.

"That sugar and perhaps other carbhydrates are to some degree destroyed and lost by fermentation in the silo, is proved by the appearance of fermentation products, especially carbonic acid gas." In conclusion they are unable to indicate the quality or even the kind of changes that go on in the silo. The antiseptic quality of acids, especially carbonic acid gas, which has lately been demonstrated by Kolbe, is such as to lead to the conclusion that *no considerable* amount of chemical change or of loss of nutritive matters *can go on* in the well constructed silo.

2. The New Jersey Agricultural Experiment Station, located at New Brunswick, was established by Act of Legislature in 1880. It is controlled by a board of managers, consisting of the Governor of the State, the board of visitors of the State Agricultural College, together with the President and Professor of Agriculture of that institution.

We had the pleasure of meeting the director of the station, Professor George H. Cook, LL.D., who kindly answered every one of our many questions. It was Dr. Neale, the chemist, who most ably and liberally did all in his power to explain to us the experiments both of the laboratory and of the field. In the course of our conversation the Doctor informed me that the station had been three years in existence, that its income, first year, was $5,000, and its income at present, $8,000. He further informed me that the work of the station must be thoroughly practical so that the Government may be warranted in using the people's money. He also said that in some parts of the State the farmers would starve if they did without artificial fertilizers. At the time of my visit he had just finished the analyses of the *incomplete fertilizers*. From the analyses and the valuation based thereupon (price same as that given under Connecticut) he said, the manufacturers would sell the *crude stock*, this year, at a lower price than the station's valuation. The analyses of the complete fertilizers were at the time of my visit under headway and have since been published. By *incomplete fertilizers* is meant any one of the artificial fertilizers taken alone, as for instance, nitrogen in any one of its forms, etc., etc. ; by a *complete fertilizer* is meant a combination of the artificial fertilizers, viz., of superphosphate, potash salt, and of some material containing nitrogen. A special manure represents a complete manure particularly adapted for some one crop. It is not an easy matter to practise dishonesty in the manufacture and sale of the incomplete fertilizers, nitrate of soda, superphosphate of lime, and potassium chloride being almost recognizable by their physical properties. A mixture of these fertilizers may have any appearance and so be exceedingly deceiving to the eye. We shall give a few examples of dishonest dealing that were detected about the time of our visit.

In special fertilizers, the cost in every case, exceeded the station's valuation. In Mape's Corn Manure, H. J. Baker Bros.' Potato-Fertilizer, and in Stockbridge Potato-Fertilizer, the cost per ton exceeded the estimated value more than nine dollars. It is in the manufacture of the complete fertilizers that the greatest dishonesty is practised. In N. J. Chem. Co's Button Bone Fertilizer, the deception amounted to sixteen dollars ($16.00) per ton ; in Jones' Meat, Blood and Bone Fertilizer, the deception amounted to twenty-six dollars and ninety-seven cents,($26.97) per ton. One case we shall give in full. In one hundred pounds of Wagener's Mineral Fertilizer there were 0.12 lbs. organic nitrogen ; 0.93 lbs. reverted phosphoric acid ; 0.46 lbs. insoluble phosphoric acid ; and 1.75 lbs. muriate of potash. The estimated value of these meagre constituents was four dollars and eight cents, ($4.08) and Wagener of the famous Jeptha A. Wagener & Co., New York, had been charging fifty-eight dollars a ton for this manure. The farmers who had purchased their manure from Wagener, paid $58.00 for that which was worth but $4.08. Some of the roguish manufacturers would gladly murder the Station's Chemist if they dared. By the farmers the same chemists are held in great esteem. The analysis of fertilizers forms the chief work of the New Jersey Agricultural Experiment Station.

In the field experiment the Station has made with fertilizers on Indian Corn, superphosphate, (350 lbs.), and muriate of potash, (150 lbs.) have given the highest yield viz.,

55 bushels of shelled corn per acre. In the field experiments with fertilizers on Oats, nitrate of soda (150 lbs.), superphosphate, (350 lbs.), and muriate of potash (150 lbs.) yielded the highest returns, viz., 60 bushels per acre. In the field experiments with fertilizers on wheat, fine barn-yard manure stood highest (30.6 bushels per acre); nitrate of soda (150 lbs.), superphosphate (350 lbs.), and muriate of potash (150 lbs.) stood second, viz., 28.1 bushels per acre.

A good suggestion is given by the Station upon the use of dried muck as a bedding for horses and cows. In forms of excellent muck the value of nitrogen and ash constituents may not exceed seventy-eight cents per ton. The cost of muck is little more than the cost of wheat straw and not one half so much as stable men pay for rye straw.

"Straw and sawdust absorb but three and four times their own weight of liquid manure, while muck will absorb eight times its own weight, and prevent all smell of ammonia in the stables.

"A practical farmer in Germany reports that by throwing 50 pounds of dried muck into a horse stall and adding about two pounds each day, the bed remained fit to use for three weeks, and the horse was easier to clean than when straw was used. In case of cows, it was found best to use about 5 pounds per head, cleaning the stable each day. Used in this manner throughout this State, it would affect a very considerable saving in more than one direction.

"Straw contains much stock food, and when properly mixed with cotton seed meal or other similar feed is readily eaten by milch cows. The nitrogen and ash which the straw contains after having passed through the animal's body, are considered more available as plant food than before. In urging farmers and dairymen to feed straw and save hay, the objection has been that there was no substitute to use as an absorbent. Those however, who have accepted the only half dried muck as their absorbent are perfectly satisfied with the results."

In the ensilage experiments three important questions have been asked and answered:

First, is the loss of food by fermentation, when green fodder corn is dried in stacks, greater or less than when it is preserved in a silo?

Second, will cows eat the dried corn fodder as readily and with as little waste as they will eat ensilage?

Third, how does the milk of cows which are fed dried fodder corn compare in quantity and quality with the milk of the same cows when ensilage is used?

Analysis has shown that 100 pounds of the green corn contain 75 pounds of water. This being so, 400 pounds of this corn would yield 100 pounds of dry matter. It was found by analysis and subsequent reckoning that eighty-two pounds of the dry matter of the ensilage and $82\frac{3}{4}$ pounds of the dry matter of field cured stalks, contain the same weight of ash which 100 pounds of the dry matter of the green corn contain. This being so, 400 pounds of green corn, during the process of field curing lost $17\frac{1}{4}$ pounds of dry matter, while 400 pounds of green corn packed in a silo lost 18 pounds of dry matter. It was found further that neither the field-cured corn nor the ensilage suffered a loss of proteine, fat or fiber, but that the total loss fell upon the class of Carbohydrates—Sugar Starch &c., &c.

In answer to the second question, the facts of experiment seem to show, that dried fodder corn, when cut and crushed, is eaten quite as readily and with as little waste as ensilage.

In answer to the third question the facts of experiment proved that in three cases the yield of milk was not increased when ensilage was substituted for dried corn, but in one case, ensilage caused an increase of eighty-seven pounds of milk in forty days. The Station's investigation of the subject is not yet closed.

3. The New York Agricultural Experiment Station, located at Geneva, was incorporated by an act of the Legislature passed in August, 1881, and was organized and came into possession of its grounds in March, 1882. It owns a farm, with dwelling house and chemical laboratory, green house and feeding house. The sum of $40,000.00 has been appropriated for two years' support of the Station and $25,000.00 for the purchase of the farm and buildings.

The Director, Dr. E. Lewis Sturtevant, gave his Canadian visitor a hearty welcome, and by an invitation as earnest as it was cordial made it necessary and pleasant for his visitor to become his guest. Between the very learned, fluent and courteous Director and his accurate, genial and obliging chemist, Dr. Babcock a night and part of two days were spent most inspiringly. The first walk with the Director through the Station Gardens presented "an epitome of the seed catalogues" in full bloom, every seed advertized for sale having been planted in its season, with the exception of the potato. At the time of which I speak there were growing in the Gardens considerably over a thousand different varieties of plants. To every attentive observer the potency of seed became at once apparent; he would instinctively recognize that each seed had a character of its own and furnished a plant slightly different in appearance from any other plant.

Dr. Sturtevant is most earnestly endeavoring, in the cultivation of the agricultural plants, to bring them to a normal, and hence perfect, state of development: for the accomplishment of this purpose all the physical and chemical conditions of plant growth are carefully taken into consideration. The Doctor believes that the experiments made upon soils with artificial manures, even on the "Co-operative System," will produce no abiding results, unless the seeds experimented with possess a potency of growth both normal and perfect. The plant whose powers of growth have reached perfection will, under suitable conditions, produce in every case the same results. Unless, in experimenting upon soils with fertilizers, plants of like productive power are used, uncertainty will continue, as in the past, to a great extent, connected with the results. We sincerely hope Dr. Sturtevant may reach a happy completion of his work, that, with like plant-forces, the study of soils and soil-manuring may be successfully undertaken. We can only refer to a few of the more interesting discoveries the Doctor has made.

The almost universal practice of rejecting the butt and tip kernels from the selection of seed corn has been proved foolish. In fruit corn the tip kernels have a stronger vegetative power and showed in 1882 a greater cropping capacity than did the centre or butt kernels. The following table gives the surprising and unexpected results:

SEED USED.

	Butt.	Central.	Tip Kernels
Merchantable ears, per 100 plants	111	90	118
Unmerchantable ears, per 100 plants	42	20	16
Total ears, per 100 plants	153	110	134
	In.	In.	In
Average length of merchantable ears	7.1	6.3	7.8
	Lbs.	Lbs.	Lbs.
Average weight merchantable ears, per 100 plants.	50.0	37.3	50.0
Average weight of 100 merchantable ears	44.6	40.9	42.0

"1. The tip kernels were the most prolific of good corn.

"2. The butt kernels were more prolific of good corn than the central kernels.

"3. The tip kernels bore longer ears than the other kernels, the butt kernels the next, and the central kernels the shortest. This fact was apparent to the sight as the corn lay upon the ground after husking.

"4. The merchantable ears from the butt were distinctly heavier than those from the tip, and those from the tip distinctly heavier than those from the central kernels.

"5. The butt kernels furnished more unmerchantable corn than did the central kernels, and the central kernels more than did the tip kernels."

Our attention was called by Dr. Sturtevant to the internal visible structure of the potato tuber. From peculiarly organized central stem, "vegetative axis," similarly organized branches run out to the different eyes. As these potato eyes are arranged in a spiral upon the tuber, we can readily, by commencing to cut with the stem and at the first eye, and, secondly, by rotating the potato so as to bring the eyes in succession under

the knife, divide the potato tuber into pieces containing each an eye and a portion of the interior vegetative axis of the potato.

This theory of cutting the potato tuber is based upon its structure. To put the theory to a crucial test, two potatoes, under conditions of green-house control, were cut in a reverse manner, the slope of the cutting in the one being toward the stem end—the proper cut—that of the cutting in the other being toward the seed end. "The proper cut"—10 seed—furnished plants 2·6 inches tall, bearing seven underground stems and four tubers from three-fourth inch to one inch in diameter. The reversed cut, twelve seed, yielded plants 1·9 inches in height, bearing eight underground stems and one tuber three-fourth inch in diameter." This green house experiment has since been verified by numerous field experiments, under the natural conditions of growth. It has further been found that single eyes are capable of bearing all the potatoes that can be expected to be grown in a hill. In planting whole potatoes or half potatoes but few eyes normally develop growth. It is therefore considered a waste to use whole potatoes for seed, each eye of the potato being able to produce a stalk or a conglomeration of stalks.

We were further interested in Dr. Sturtevants method of cultivating the potato. He believes that the system of cultivation which allows the tubers to be formed *in warm and dry soil*, while the roots occupy a *cool and moist soil*, is the most advantageous. To produce these conditions high ridges were thrown up four feet apart and planted with ordinary cuts, one foot apart on the ridge. On June 7th, sixteen days after they had vegetated, a mulching of four inches of moist straw was applied between the ridges. It was thought by the high ridging to secure dryness for the tuber, and by mulching the intervals to secure moisture and coolness for the roots. To disturb the soil as little as possible there was no hoeing or cultivation during growth, the weeds being simply cut away lightly. There had been gained by this method, in 1882, a yield per hundred hills of 184 pounds of merchantable tubers as against eighty-three pounds grown under ordinary ridge culture.

Though the experiments of 1882 so highly favoured the hypothesis, the Doctor, when we saw him in July of this year, did not appear absolutely certain that the experiments of wet 1883 would continue to do so. From the October bulletin of the station we learned that with seven trials on areas 1-20 acre for each method, the mulched plats in no case yielded the larger crop, and, in most cases, a manifestly inferior crop. The 10·59 inches of rain which fell during June, July and August had made the ridges between the mulching damp, and so destroyed the theoretical conditions of the experiment. Many other interesting points about seeds might be noticed if time permitted.

A well built and conveniently furnished house for feeding cattle was carefully examined. In the feeding experiments the ingestor and egestor are carefully weighed and analyzed. The anlmals are also weighed at proper intervals. The principle brought out by a series of experiments, the Doctor informed me, was that food influenced the butter quantity of the milk to a greater extent than it did the butter quality.

Upon the lysimeters, or drain gauges, of the station we shall speak under meteorology.

The laboratory of the station is filled with very choice sets of chemical apparatus. Some of Dr. Babcock's cases with the necessary apparatus attached we have to the extent of our resources imitated.

4. Results of Experiments at Rothamsted, England.

In last year's report we briefly reviewed "Memoranda of the origin, plan, and results of the experiments conducted on the farm and in the laboratory of Sir John Bennet Lawes, Bart., LL.D., F.R.S., at Rothamsted, Herts." First, we considered the conditions under which the field experiments and the cattle feeding experiments were conducted. Second, the interesting results, obtained from the field experiments on the growth of permanent meadow land, wheat, barley, oats, and some leguminous crops, with no manure, and with different manures, were given. Third, the remarkable result obtained by alternating wheat with beans and the supposed cause of "clover sickness" and its best cure were noticed.

The memoranda of this year give a continuation of the experiments with little that is really new. The experiments on *root crops*, not referred to in last year's report, we shall briefly review in this year's,

Experiments with turnips were commenced in 1843. Eight acres, divided into numerous plots, were set apart for the purpose, and the crop was grown for ten consecutive years on the same land. "Norfolk whites," 1843-1848; and "Swedes," 1849-1852; on some plots without manure, and on others with different descriptions of manure.

A new series of experiments with Swedes was arranged in 1856, having regard to the character of the manures previously applied on the different plots, and to the results previously obtained. This second series was continued for fifteen years, namely, from 1856 to 1870 inclusive.

1. *Norfolk White Turnips;* roots and leaves carted off the land:—

(1) Average 1846–'47–'48, without manure, roots, 1 ton, 4 cwt.; leaves 0 tons, 17 cwts. per acre. The same, cross-dressed with 1840 lbs. rape-cake, yielded 6 tons, 11 cwts. roots and 3 tons, 3 cwts. leaves.

(2) Superphosphate, each year; potass, soda and magnesia, 1847–'48, 8 tons, 1 cwt. roots and 2 tons 15 cwts. leaves. The same, cross-dressed with 160 lbs. sulphate ammonia, 75 lbs. muriate ammonia and 1840 lbs. rape-cake, yielded 10 tons 5 cwts. roots and 6 tons 1 cwt. leaves.

2. Swedish Turnips; four seasons, 1849–1852; roots and leaves carted off the land:—

(1) Without manure, 1846 and since, 2 tons 6 cwts. roots and 0 tons 6 cwts. leaves. The same, cross-dressed with 2000 lbs. rape-cake, yielded 7 tons 14 cwts. roots and 0 tons 13 cwts. leaves.

(2) Superphosphate, sulphates potass and magnesia, and soda ash, 7 tons 17 cwts. roots and 0 tons 10 cwts. leaves per acre. The same, cross-dressed with 200 lbs. ammonia-salts and 2000 lbs. rape-cake, yielded 13 tons 1 cwt. roots and 0 tons 18 cwts. leaves.

The experiments on *Sugar Beet*, commencing 1871, were grown year after year on the same land, without manure, and with different descriptions of manure. The area under experiment has been about eight acres.

14 tons farm yard manure produced, 1871, 18 tons 3 cwt. roots and 3 tons 5 cwts. leaves. In 1872, the yield was 15 tons 13 cwts. roots and 4 tons 2 cwts. leaves. The yield of other years is about the same. The 14 tons farm yard manure, cross-dressed with 2000 lbs. rape-cake, yielded, 1872, 28 tons 18 cwts. roots and 5 tons 14 cwts. leaves per acre. This is the highest yield. The yield from artificial manures is scarcely half the yield from farm yard manures.

The experimenters at Rothamsted have been endeavouring, by chemical analysis, to ascertain the influence of different manures and different seasons on the composition of Sugar beet. Each year the seed was sown on all the plots at the same time, and the samples for analysis were taken from all within a period of about a week, beginning with the ripest. The dry matter, ash and nitrogen, were determined in the roots themselves: but they have generally been determined in the expressed juice also. The sugar was determined in the juice; and calculated into its percentage in the roots, on the assumption that they contain uniformly 95 per cent. of juice. In the yield we gave of the plot with 14 tons farm yard manure there were 17.04 per cent. dry matter, 11.77 per cent. sugar, 0.821 per cent. ash, and 0.142 per cent. nitrogen. The highest percentage of dry matter and of sugar was obtained from no manure, the yield being only 4 tons 11 cwts. roots and 1 ton 7 cwts. leaves per acre. The percentage dry matter was 20.22; the percentage sugar 14.66.

The experiments on mangold wurzel were commenced, 1876, and continued five seasons, until 1880.

Fourteen tons of farm yard, 1876, yielded 19 tons 12 cwts. roots and 4 tons 9 cwts. leaves per acre. The same quantity farm yard manure cross-dressed:—

1. With 550 lbs. nitrate of soda, yielded 23 tons 2 cwts. roots and 7 tons 5 cwts. leaves per acre.

2. With 400 lbs. ammonia salts, yielded 29 tons 19 cwt. roots and 7 tons 12 cwts. leaves per acre.

3. With 2000 lbs. rape-cake and 400 lbs. ammonia salts, yielded 31 tons 9 cwts. roots, and 10 tons 5 cwts. leaves per acre.

4. With 2000 lbs. rape-cake simply, the yield was 24 tons 9 cwts. roots and 5 tons 19 cwts. leaves.

The 14 tons farm yard manure and 3½ cwts. superphosphate produced together, and with the cross-dressings just mentioned, about the same as farm yard manure alone. No manure (1846 and since) produced 6 tons 10 cwts. roots and 1 ton 14 cwts. leaves; cross-dressed with 2000 lbs. rape-cake and 400 lbs. ammonia salts, the yield was 19 tons and 19 cwts. roots and 7 tons 7 cwts. leaves.

In the experiments on Potatoes, commencing 1876 and continuing five seasons, a mixture of 550 lbs. nitrate of soda, 3½ cwts. superphosphate, 300 lbs. sulph. potass, 100 lbs. sulph. soda and 100 lbs. sulph. mag., produced the highest yield. In 1876, the total produce per acre was 8 tons 15⅜ cwts.; in 1877, it was 8 tons 13¾ cwts.; in 1878, it was 9 tons 4¼ cwts. The total yield, from 14 tons farm yard was, in 1876, 4 tons 5¼ cwts.; in 1877, 5 tons 18 cwts.; in 1878, 5 tons 11¾ cwts. It is remarkable that the mixture of artificial fertilizers has produced, in every case, about twice as much as the farm yard manure.

Experiments on an actual course of Rotation—turnips, barley, leguminous crops or fallow), and wheat were commenced in 1848. The present crop (1883) is the 36th experimental one, or the fourth crop of the ninth course. One-third of the land has been continuously unmanured; one-third manured with Superphosphate of Lime alone once every four years, that is for the turnip crop commencing each course, and one-third manured (also for the turnip crop only) with a complex manure which, for the third, fourth, fifth, sixth, seventh, eighth, and ninth courses, consisted of 300 lbs. sulphate of potass, 200 lbs. sulphate of soda, 100 lbs. sulphate of magnesia, 200 lbs. bone ash, 150 lbs. sulphuric acid, 100 lbs. sulphate of ammonia, 100 lbs. muriate of ammonia, and 2000 lbs. of rape cake. Clover was sown in some of the courses, but failed; in other of the courses beans were taken instead of the clover on half of each plot, and the other half left fallow. From half of each of the three plots the whole turnip crop (roots and leaves) was removed, and on the other half the roots were eaten on the land by sheep, and the uneaten leaves spread and ploughed in. In the case of all the other crops, the total produce was removed from the land. The following table contains the average of the first eight courses, 1848—1879:—

AREA UNDER EXPERIMENT, ABOUT 2½ ACRES.

YEARS.	Description of Crop.	PRODUCE PER ACRE.								
		Plot 1. *Unmanured Continuously.*			Plot 2. *Superp'osphate of Lime, alone, for the Turnip Crops only.*			Plot 3. *Complex Manure for the Turnip Crops only.*		
		Grain (or Roots)	Straw (or Leaf)	Total Produce.	Grain (or Roots.)	Straw (or Leaf.)	Total Produce.	Grain (or Roots.)	Straw (or Leaf.)	Total Produce.
1848, '52, '56, '60, '64, '72, '76	Swedish Turnips	26⅝ cwts.	9½ cwts.	35⅞ cwts.	148¾ cwts.	26⅝ cwts.	175⅜ cwts.	272½ cwts.	43⅜ cwts.	315⅞ cwts.
1849, '53, '57, '61, '65, '69, '73, '77.....	Barley	34⅝ bush	2159 lbs.	4132 lbs.	28½ bush.	1730 lbs.	3346 lbs.	41⅜ bush	2577 lbs.	4955 lbs.
1850, '54, '58, '62, '66, '70, '74, '78	Clover.....	.....	.....	42⅞ cwts.	.....	.....	55 cwts.	.....	.....	73⅝ cwts.
	Beans	12⅞ bush.	1081 lbs.	1867 lbs.	12½ bush	1200 lbs.	1996 lbs.	21⅞ bush	1809 lbs.	3230 lbs.
1851, '55, '59, '63, '67, '71, '75, '79.....	Wheat	25⅞ bush.	2905 lbs.	4559 lbs.	27⅜ bush.	3067 lbs.	4823 lbs.	30⅝ bush.	3698 lbs.	5669 lbs.

The results given in this table are highly suggestive. The weight in roots of Swedish turnips from superphosphate of lime (3½ cwts. third, fourth, fifth, sixth, seventh, eighth and ninth courses) was nearly six times that from *no manure*. The Barley did better after Swedish turnips with no manure (34⅝ bush.) than after Swedish turnips with 3½ cwts. superphosphate of lime (28⅛ bushels.) After turnips with *mixed manure* the barley yield was high, 41⅝ bushels. The beans following barley were as productive on the unmanured plot, as on the plot that had received with the turnips 3½ cwts. superphosphate of lime. From the plot, with complex manure, nearly double as many bushels of beans were taken as from the unmanured plot. In every case the manure increased the yield of clover. The plot manured with the superphosphate (the turnip year) yielded two bushels more wheat to the acre than the unmanured plot; and the plot which had received the complex manure (the turnip year) yielded five bushels more wheat to the acre than the unmanured plot. It is evident from the yield of this four years' rotation (covering 32 years) that the superphosphate of lime most aids the turnips, has no influence on the barley, and helps the wheat four years after its application. It is to be regretted that the cost of the fertilizer has not been given; by a simple reckoning the actual gain or loss from the manures in the rotation could be easily ascertained.

2. METEOROLOGY.

Report of Observations taken at the Ontario Agricultural College During 1883.

During the past year some additions have been made to the instruments of the Meteorological Department of our College.

Observations are regularly taken at the hours of 7 a.m., 2 p.m., and 9 p.m. daily, and recorded in a book printed for the purpose. The instruments in use are as follows:—

Anemometer—Recording the direction of the wind and indicating the number of miles travelled.

Barometer—Showing the atmospheric pressure at the time of observation.

Maximum thermometer — Indicating the highest temperature between times of observation.

Minimum thermometer — Indicating the lowest temperature between times of observation.

Hygrometer—With *dry* and *wet* bulb thermometers, for the purpose of showing the condition of the atmosphere with reference to moisture.

Pluviameter—Used in measuring the rainfall.

Thermometer—For observing ordinary temperature.

Besides taking observations from these instruments, the cloudiness of the sky is observed, and general remarks on the weather for the day are recorded in the daily register. Each morning a form, as seen below, is filled out and given for publication to the daily papers in Guelph. At the close of each month a summary of the month's observations is also given for publication. From these monthly summaries the condensed statement of the year's meteorology is made out.

In my course of lectures on Meteorology, the practical method of teaching is adopted. "The instruments named above are fully described, and the students taught not only how to read them, but also to epitomize the observations taken in such a way as to make them interesting and instructive."

At examinations the same practical method is used.

The "series of experiments for the purpose of ascertaining some facts in reference to the temperature of different soils exposed to similar conditions," promised by Professor Panton in the report of 1881, and by the writer in last year's report, we shall begin making in the spring of 1884. From J. and H. T. Green, 757 Broadway, New York, eight soil thermometers have been purchased. These thermometers will be inserted in the soil, first, one inch; second, three inches; third, six inches; fourth, nine inches; fifth, twelve inches; sixth, twenty-four inches; seventh, thirty-six inches; eighth, forty-eighth inches, and will be read *three times* a day. By these soil thermometers we shall be able, first, to ascertain the temperature of the soil when the different agricultural seeds are sown; second, to follow the variations in soil temperature during spring, summer and autumn.

A new minimum thermometer was, during the year, presented to the College by the Meteorological Office, Toronto.

Form of Record Published Daily in the Guelph Papers.

WEATHER RECORD.

Ontario Agricultural College.

.....1883.

Normal height of barometer at Guelph (1,100 feet above sea level and 740 above sea level and 740 above Lake Ontario), 28.86 inches. Average temperature for.....

Barometer ..... { Height.....inches. / Change.....

Hygrometer.....Moisture.....

Anemometer .... { Direction of wind..... / Miles travelled during previous twenty-four hours.....

Minimum temperature during preceding twenty-four hours.....

Maximum " " " " .....

Pluviameter—Rainfall.....inches.

Form of Monthly Summary.

Meteorology.

A summary of the meteorological observations taken at Ontario Agricultural College during the month of.....

Barometer—
- Highest barometer.
- Lowest "
- Highest mean barometer.
- Lowest " "
- Monthly " "
- Monthly range.

Thermometer—
- Highest thermometer.
- Lowest "
- Highest mean thermometer.
- Lowest " "
- Monthly " "
- Monthly range.

Hygrometer—
- Day of greatest humidity.
- Day of least "
- Mean "

Pluviameter—
Days rain fell.
Greatest rainfall.
Days snow fell.
Greatest snowfall.
Total precipitation.

Anemometer—
Direction of wind.
Greatest number of miles travelled in twenty-four hours.
" velocity per hour.
Mean velocity per month.

Clouds—
Cloudy days.
Clear "
Mean cloudiness for the month.

The following is a summary of the observation taken during the year 1883 :—

I. JANUARY.

Barometer.

Highest barometer, 14th, 9 p.m.	29.954 inches.
Lowest barometer, 20th, 9 p.m.	28.210 "
Highest mean barometer, 4th	29.214 "
Lowest mean barometer, 13th	28.385 "
Monthly mean barometer	28.784 "
Monthly range	1.744 "

Thermometer.

Highest temperature, 30th	40. °
Lowest temperature, 23rd	–.16°
Highest mean temperature, 30th	32.1°
Lowest mean temperature, 22nd	–.9°
Monthly mean temperature	19.8°
Monthly range	56'

Pluviameter.

Days rain fell, 1, 20th	0.5 inches.
Days snow fell, 7	11.0 "
Greatest snowfall, 13th	4.0 "
Total precipitation	1.6 "

Anemometer.

Direction of the wind :

N.	E.	W.	S.	N. E.	N. W.	S. E.	S. W.
3	4	13	12	15	5	4	29

Greatest number of miles travelled in 24 hours, 21st	913 miles.
Greatest velocity per hour, 13th	48 "
Mean velocity for the month	15.29 "

Clouds.

Cloudy days	16
Clear days	10
Mean Cloudiness for the month	4.6

Remarks.

The first part of this month was cold—the wind blowing from the west and north-west. The barometric pressure was steady until the 10th and 11th, when it fell to 28.404 inches. On the 14th, at 9 p.m., it gradaally rose to 29.954 inches, the weather becoming finer. A slight thaw on the 20th was accompanied by rain to the depth of .5 of an inch.

The latter half of the month was characterized by steady cold weather—little snow falling, and the wind being changeable.

The January of 1883 differs from that of 1882 in two respects:

1. The *lowest temperature* of the first being 22° below zero, that of the latter but 16° below zero. 2. The *monthly mean temperature* of the first being 20.5°, that of the latter 19.8°.

II. February.

Barometer.

Highest barometer, 12th, 2 p.m.	29.372 inches.
Lowest barometer, 16th, 9 p.m.	28.450 "
Highest mean barometer, 12th	29.278 "
Lowest mean barometer, 16th	28.585 "
Monthly mean barometer	28.957 "
Monthly range	0.922 "

Thermometer.

Highest temperature, 17th	49.°
Lowest temperature, 13th	− 5°
Highest mean temperature, 16th	33.5°
Lowest mean temperature, 5th	4.6°
Monthly mean temperature	16.2°
Monthly range	54.°

Pluviameter.

Days rain fell, 2	0.26 inches
Greatest rainfall, 16th	0.25 "
Days snow fell, 5	13.5 "
Greatest snowfall, 3rd	6.0 "
Total precipitation	1.61 "

Anemometer.

Direction of wind:

N.	E.	S.	W.	N. E.	N. W.	S. E.	S. W.
1	2	8	23	8	10	1	25 times.

Greatest number of miles travelled in 24 hours, 8th	723 miles.
Greatest velocity travelled per hour, 8th	30 "
Mean velocity for the month	16.2 "

Clouds.

Cloudy days	8
Clear days	11
Mean cloudiness for the month	6

Remarks.

The weather was changeable and sky overcast during the first week of February, the wind blowing from the south-west, accompanied by flurries of snow on the 1st, 2nd, and 7th.

On the 14th, with north-east wind, snow again fell, the temperature rising towards noon. A thaw commenced on the 15th and continued three days, rain falling on the 16th.

During the rest of the month the temperature was lower and winds stronger, accompanied by local snow-storms. The mean temperature of February was much below the average. The lowest temperature of Febrnary, 1882, was 8°, that of 1883, 5° below zero; the monthly mean temperature of 1882 was 27.8°, that of 1883, 16.2°.

The last day of the month was calm and pleasant.

III. March.

Barometer.

Highest barometer, 5th, 7 a.m.	29.214 inches.
Lowest barometer, 10th, 2 p.m.	28.064 "
Highest mean barometer, 5th	29.133 "
Lowest mean barometer, 10th	28.129 "
Monthly mean barometer	28.765 "
Monthly range	1.150 "

Thermometer.

Highest temperature, 14th	47.°
Lowest temperature, 21st	−.7°
Highest mean temperature, 14th	37.1°
Lowest mean temperature, 7th	6.°
Monthly mean temperature	20.1°
Monthly range	54.°

Pluviameter.

Days snow fell, 4	19.5 inches.
Greatest snowfall, 19th	11. "
Total precipitation	1.95 "

Anemometer.

Direction of the wind:

N.	E.	S.	W.	N. E.	N. W.	S. E.	S. W.
4	2	7	15	11	19	4	23

Greatest number of miles travelled in 24 hours, 15th	790 miles.
Greatest velocity per hour, 15th	33 "
Mean velocity for the month	13.7 "

Clouds.

Cloudy days	8
Clear days	11
Mean cloudiness for the month	6.5

Remarks.

The 1st of March was fair and bright, with moderate temperature and S. to S.W. winds. The 2nd was colder, with N.E. wind and sky a little overcast; the cold continued during the 3rd and 4th, snow falling upon the 4th. The 5th was warmer, with a light breeze from the N. E., snow falling on the morning of the 6th. Towards the evening of the 6th the temperature fell and the wind changed to the S. E. The cold was continued during the 7th and 8th, with stronger winds from the S. W. and W.

During the 9th and 10th the weather was again pleasant. On the evening of the 10th the wind blew firmer from the N. W., changing on the 11th, and increasing on the 12th to a strong wind from the S. W. A S. W. breeze with continued mild weather prevailed during the 13th and 14th, causing a thaw on the 14th. The wind changed to N. W. on the 15th, with lower temperature and drifting snow storm in the afternoon; clearing away towards evening the weather remained pleasant until the evening of the 16th, when the sky became cloudy and flakes of snow were drifted from the west. The 17th was mild with wind changing to the N.; at 9 p.m. snow began to fall and continued falling until the evening of the 19th, the wind in the meantime having changed to the N. E. After the snow the sky cleared and the temperature fell to 7° below zero. The cold continued until the 25th. During the last week the weather was steady, with cold, frosty nights and sunny days.

The barometric pressure was high and steady during the first week of the month. At noon of the 6th the barometer fell to 28.344, rising on the evening of the 7th to 29.208, and falling again at noon of the 10th to 28.064. The pressure remained comparatively low until the 24th, when it became higher and steadier.

IV.—April.

Barometer.

Highest barometer, 13th, 2 p.m	29·068	inches.
Lowest barometer, 11th, 7 a.m	28·234	"
Highest mean barometer, 13th	29·041	"
Lowest mean barometer, 11th	28·399	"
Monthly mean barometer	28·794	"
Monthly range	0·834	"

Thermometer.

Highest temperature, 15th	74°·5
Lowest temperature, 1st	8°
Highest mean temperature, 14th	56°·5
Lowest mean temperature, 2nd	27°
Monthly mean temperature	36°·7
Monthly range	66°·5

Pluviameter.

Days rain fell, 3	1·39	inches
Greatest rainfall, 19th	0·71	"
Days snow fell, 1	1·6	"
Total precipitation	1·45	"

Anemometer.

Direction of wind :—

N.	E.	S.	W.	N. E.	N. W.	S. E.	S. W.
7	5	5	10	19	12	2	20

Greatest number of miles travelled in 24 hours, 11th ..... 648 miles.
Greatest velocity per hour, 11th ..... 29 "
Mean for the month ..... 19 miles per hour.

CLOUDS.

Cloudy days 8
Clear days 13
Mean cloudiness for the month ..... 5·8

REMARKS.

The first week of April was fair with steady temperature; the barometric pressure was high and regular.

Snow fell to the depth of 1·5 inches on the 7th. From the 7th to the 15th the temperature was higher with easterly winds and overcast sky. The barometric pressure fell to 28·570, with ·71 of an inch of rain on the 19th. After the 19th the weather became cooler with chilling winds which continued throughout the remainder of the month.

The marked features of the month were: (1) The absence of the usual April showers. (2) The continued cold weather and frosty nights. (3) The dry and chilling winds. These conditions retarded growth and seriously injured fall wheat.

V.—MAY.

Barometer.

Highest barometer, 3rd, 9 p.m ..... 29·104 inches
Lowest barometer, 30th, 9 p.m ..... 28·464 "
Highest mean barometer, 17th ..... 29·041 "
Lowest mean barometer, 21st ..... 28·525 "
Monthly mean barometer ..... 28·770 "
Monthly range ..... 0·640 "

Thermometer.

Highest temperature, 19th ..... 76°
Lowest temperature, 10th ..... 30°
Highest mean temperature, 19th ..... 64·2°
Lowest mean temperature, 14th ..... 37·5°
Monthly mean temperature ..... 49·2°
Monthly range ..... 46°

Pluviameter.

Days rain fell, 8 .....
Greatest rainfall, 11th ..... 1·01 inches
Total precipitation ..... 2·871 "

Anemometer.

Direction of the wind :—

N.	E.	S.	W.	N. E.	N. W.	S. E.	S. W.
14	13	10	17	8	6	1	16

Greatest number of miles travelled in 24 hours, 19th ..... 728 miles.
Greatest velocity per hour, 19th ..... 30·3 "
Mean for the month ..... 14.138 "

CLOUDS.

Cloudy days	8
Clear days	10
Mean cloudiness for the month	

REMARKS.

The cool chilling weather of April continued through the first half of May, with high barometric pressure and temperature varying from 35° to 49°. The atmosphere was dull and little rain fell.

The first mild and pleasant weather occurred on the 16th. It continued pleasant until the 20th, with a warm shower favourable to plant growth on the 19th. Rain kept falling from the 21st to the 23rd. After the 23rd the temperature became higher, accompanied by pleasant weather and S. W. wind which continued with increased force until the 27th. A steady rain occurred on the 26th and local showers at intervals on the 27th. With increased cloudiness and occasional rain during the remainder of the month the weather continued mild and favourable for plant growth.

JUNE.

Barometer.

Highest barometer, 1st, 2 p.m	29·194 inches.
Lowest barometer, 11th, 7 a.m	28·264 "
Highest mean barometer, 1st	29·172 "
Lowest mean barometer, 11th	28·453 "
Monthly mean barometer	28·791 "
Monthly range	0·930 "

Thermometer.

Highest temperature, 17th	88°
Lowest temperature, 1st	42°
Highest mean temperature, 23rd	71·6°
Lowest mean temperature, 1st	56·3°
Monthly mean temperature	65·0°
Monthly range	46°

Pluviameter.

Days rain fell, 9	
Greatest rainfall, 17th	0·9 inches.
Total precipitation	4.41 "

Anemometer.

Direction of the wind:—

N.	E.	W.	S.	N. E.	N. W.	S. E.	S. W.
2	6	11	15	10	8	8	21

Greatest number of miles travelled in 24 hours, 11th	612 miles.
Greatest velocity per hour	56.8 "
Mean velocity per month	11.7 "

CLOUDS.

Cloudy days	9
Clear days	21
Mean cloudiness for the month	4·4

REMARKS.

June opened with clear pleasant weather and high barometric pressure.

During the first nine days, the temperature was high and steady, many rains occurring which completely saturated the soil; a decrease in temperature followed and was continued until the 14th.

A yellowish tinge about the leaf commenced to be visible in many of the spring crops.

On the 15th the weather was warm and pleasant, on the 17th oppressive, a thunder storm from the S. W. occurring at 5 p.m. During most of the following night heavy rain fell, followed by more heavy rain on the 18th, with a decrease in the atmospheric pressure.

From the 20th to the 23rd the weather was pleasant and vegetable growth rapid. The temperature rose to 80° on the 23rd, the atmosphere again becoming very oppressive.

Four wet days followed in succession.

The month throughout was wet and the temperature generally high.

JULY.

Barometer.

Highest barometer, 18th, 9 p.m	29·058	inches.
Lowest barometer, 12th, 9 p.m	28·530	"
Highest mean barometer, 19th	29·048	"
Lowest mean barometer, 12th	28.576	"
Monthly mean barometer	28.848	"
Monthly range	0.528	"

Thermometer.

Highest temperature, 4th	89°
Lowest temperature, 20th	46·5°
Highest mean temperature, 4th	80.3°
Lowest mean temperature, 19th	59·3°
Monthly mean temperature	68·2°
Monthly range	42·5°

Pluviameter.

Days rain fell, 11		
Greatest rainfall, 27th	0·97	inches.
Total precipitation	3·45	"

Anemometer.

Direction of wind :—

N.	E.	W.	S.	N.E.	N.W.	S.E.	S.W.
0	3	24	12	6	7	7	24

Greatest number of miles travelled in 24 hours, 17th	600	miles.
Greatest velocity per hour	23	"
Mean velocity per month	11·0	"

CLOUDS.

Cloudy days	12
Clear days	19
Mean cloudiness for the month	3.8

REMARKS.

The first week of July was remarkable for its rainy nights, misty mornings and cloudy afternoons. The temperature was high with little change in the barometric

pressure. Four days of fair weather and bright sunshine followed. During the afternoon of the 12th, clouds gathered and an hour's heavy rain commenced falling at 6 p.m. On the following day the temperature fell to 54° at 9 p.m.

From the 14th to the 17th, the weather was changeable—hot sun followed by a sultry atmosphere.

The weather during the 18th, 19th, 20th and 21st, being dry and pleasant, was favourable for ripening crops and making hay. The heaviest rainfall occurred on the 27th. It was accompanied by a western gale that laid flat the crops.

About 12 times as much rain fell during this month as during the corresponding month of last year. This unusually wet July favoured the formation of rust upon the agricultural crops.

August.

Barometer.

Highest barometer, 27th, 7 a.m	29·168	inches.
Lowest barometer, 2nd, 7 a.m	28·610	"
Highest mean barometer, 14th	29.137	"
Lowest mean barometer, 2nd	28.650	"
Monthly mean barometer	28·927	"
Monthly range	0·558	"

Thermometer.

Highest temperature, 24th	89°
Lowest temperature, 27th	41°
Highest mean temperature, 22nd	78°
Lowest mean temperature, 27th	56°
Monthly mean temperature	65·2°
Monthly range	48°

Pluviameter.

Days rain fell 2		
Greatest rainfall, 27th	0·14	inches
Total precipitation	0·2	"

Anemometer.

Direction of the wind:—

N.	E.	W.	S.	N. E.	N. W.	S. E.	S. W
4	4	8	12	12	17	14	16

Greatest number of miles travelled in 24 hours, 3rd	464	miles.
Greatest velocity per hour	22·3	"
Mean velocity per month	10·6	"

Clouds.

Cloudy days	5
Clear days	25
Mean cloudiness for the month	2.4

Remarks.

August opened with fair weather. The barometric pressure gradually increased at the beginning of the month and continued high and steady throughout it. The days

were warm and sunny, the nights clear and cool. On the 17th and 18th the temperature was high and the atmosphere oppressive. Rain followed with clear atmosphere and chilly nights. A light shower occurred on the 27th. The last days of the month were warm and pleasant, the nights chilly.

SEPTEMBER.

Barometer.

Highest barometer, 10th, 7 a.m	29·280 inches.
Lowest barometer, 24th, 9 p.m	28·218 "
Highest mean barometer, 10th	29·223 "
Lowest mean barometer, 24th	28·393 "
Monthly mean barometer	28·931 "
Monthly range	1·062 "

Thermometer.

Highest temperature, 16th	81°
Lowest temperature, 9th	29°
Highest mean temperature, 15th	69·1°
Lowest mean temperature, 29th	42·3°
Monthly mean temperature	55·4°
Monthly range	52°

Pluviameter.

Days rain fell 6	
Greatest rainfall, 24th	0.7 inches.
Total precipitation	2·07 "

Anemometer.

Direction of the wind :—

N.	E.	W.	S.	N. E.	N. W.	S. E.	S. W.
2	7	13	3	7	20	10	19

Greatest number of miles travelled in 24 hours, 25th	646 miles.
Greatest velocity per hour	31.7 "
Mean velocity per month	9·09 "

Clouds.

Cloudy days	
Clear days	
Mean cloudiness for the month	3·1

Remarks.

Unlike the corresponding month of last year, the weather for the first few days of September this year was changeable, the 1st being overcast, 2nd and 3rd fair, and the 4th dull with a light rain towards evening, and dull cool days following.

A hard frost occurred on the nights of the 9th and 10th doing much damage to many agricultural crops. The frost was followed by a light rain on the 13th when the weather became warm and sunny. The barometer rose to 29·218 on the 18th at 2 p.m., accompanied by fair weather. Light rains occurred on the 24th and 27th, the barometric pressure falling on the 24th at 9 p.m. to 28.218. The weather, during the last days of the month, was fair, the temperature remaining steady and the pressure high.

OCTOBER.

Barometer.

Highest barometer, 16th, 2 p.m	29·522 inches.
Lowest barometer, 29th, 2 p.m	28·062 "
Highest mean barometer, 16th	29·475 "
Lowest mean barometer, 29th	28·194 "
Monthly mean barometer	28·949 "
Monthly range	1·460 "

Thermometer.

Highest temperature, 9th	77°
Lowest temperature, 21st and 27th	25°
Highest mean temperature, 9th	67·3°
Lowest mean temperature, 20th	32°
Monthly mean temperature	44·1°
Monthly range	52°

Pluviameter.

Days rain fell, 6	
Greatest rainfall, 2nd	0·7 inches.
Total precipitation	1·18 "

Anemometer.

Direction of the wind:—

N.	E.	W.	S.	N.E.	N.W.	S.E.	S.W.
4	9	12	3	12	20	10	14

Greatest number of miles travelled in 24 hours, 31st	804 miles.
Greatest velocity per hour	38·4 "
Mean velocity per month	10·7 "

CLOUDS.

Cloudy days	18
Clear days	13
Mean cloudiness for the month	5·1

REMARKS.

The temperature throughout this month was steady. The reading of the thermometer on the 1st was 30° at 7 a.m., 40° at 9 p.m.; on the 2nd 41° at 7 a.m., 40 at 9 p.m., and 40° at 7 a.m., on the 3rd. During the first week the weather was fair and the sky clear.

A few cloudy days followed. The temperature remained steady up to the 14th when the wind changed to the N. E. and the pressure gradually increased to 29·522 at 2 p.m. on the 16th, accompanied by a slight fall in the temperature. During this time the days were clear and nights chilly.

From the 18th to the 20th the sky was overcast and the temperature low. Flakes of snow were observed on the 20th.

During the remainder of the month, the sky, with the exception of the 26th and the 27th, was overcast and temperature moderate. A light rain occurred on the 29th, accompanied by a S. W. wind and a decrease in the barometric pressure to 28.062.

The marked features of the month, were the unusually steady temperature and extremes of atmospheric pressure.

November.

Barometer.

Highest barometer, 28th, 9 p.m	29·314 inches.
Lowest barometer, 16th, 7 a.m	28·168 "
Highest mean barometer, 28th	29·185 "
Lowest mean barometer, 13th	28·411 "
Monthly mean barometer	28·794 "
Monthly range	1·146 "

Thermometer.

Highest temperature, 5th, 9th 21st	58°
Lowest temperature, 15th, 16th	10°
Highest mean temperature, 5th	55°·6
Lowest mean temperature, 16th	14°·6
Monthly mean temperature	35°·1
Monthly range	48°

Pluviameter.

Days rain fell, 3	1·24 inches.
Greatest rainfall, 20th	0·8 "
Days snow fell, 5	6·0 "
Greatest snowfall, 15th	3 "
Total precipitation	1·84 "

Anemometer.

Direction of wind :—

N.	E.	W.	S.	N. E.	N. W.	S. E.	S. W.
11	2	10	5	1	14	2	18

Greatest number of miles travelled in 24 hours, 12th	828 miles.
Greatest velocity per hour	36.9 "
Mean velocity for the month	18·2 "

Clouds.

Cloudy days	19
Clear days	11
Mean cloudiness for the month	5·7

Remarks.

The most marked features of the month were :

First, the snow-storms which occurred during the week beginning with Sunday the 11th;

Second, the heavy gales of wind which blew from the North West and South West on the 12th, 13th and 14th.

The atmospheric pressure was remarkably steady (about 28·8) for the first eight days; it then became changeable and continued so until the stormy period had passed. The barometer read very low on the 16th at 7 a.m.

The temperature from the 1st to the 3rd was below the average for the month ; it rose on the 4th, and remained steady (at about 43°) until the cold of the second week commenced. The weather throughout the month was generally cold and little rain fell.

December.

Barometer.

Highest barometer	22nd, 7 a.m.,	29·522 inches.
Lowest "	18th, 7 a.m.,	28·276 "
Highest mean barometer	22nd,	29·384 "
Lowest " "	27th,	28·452 "
Monthly " "		28·806 "
Monthly range		1·246 "

Thermometer.

Highest temperature	8th,	50°
Lowest "	22nd, 23rd,	– 2°
Highest mean temperature	7th,	44·1°
Lowest " "	15th, 22nd,	8·6°
Monthly " "		24·69°
Monthly range		52°

Pluviameter.

Days rain fell	2,	0·22 inches.
Greatest rainfall	7th,	0·17 "
Days snow fell	4,	6·0 "
Greatest snowfall	28th,	2·5 "
Total precipitation		0·82 "

Anemometer.

	N.	E.	W.	S.	N.-E.	N.-W.	S.-E.	S.-W.	
Direction of wind..	10	4	15	7	5	12	16	13	times
Greatest number of miles travelled in 24 hours						14th,	609		miles.
Greatest velocity per hour							30·7		"
Mean velocity for the month							15·5		"

Clouds.

Cloudy days	24
Clear days	7
Mean cloudiness for the month	6·5

Remarks.

During the early part of this month the wintry appearance of last month was scarcely visible, the weather being so much milder.

There was very little rain at any time, and no snow until the 17th; the light one which occurred at that date protected the fall crops from the continued cold which followed.

The atmospheric pressure was generally high, the temperature of the early part of the month being moderate, that of the latter part low.

The winds were very changeable, though not so heavy as during November.

Mean Meteorological Results for the Year 1883.

	1883. — Guelph.	Average of 40 Years. — Toronto.
Barometer.		
Mean pressure for the year	29·194	29·616
Month of highest mean pressure	October.	September.
Highest mean, monthly	29·475	29·664
Lowest " "	28·129	29·572
Month of the lowest mean	March.	June.
Date of the highest pressure in the year	Jan. 14th.	
Highest pressure	29·954	30·358
Date of the lowest pressure in the year	Oct. 29th.	
Lowest pressure	28·062	28·692
Range of the year	1·892	1·668
Thermometer.		
Mean temperature of the year	41·6°	44·17°
Warmest month	July.	July.
Mean temperature of the warmest month	68·2°	67·64°
Coldest month	February.	February.
Mean temperature of the coldest month	16·2°	22·73°
Warmest day	July 4th. / August 24th.	
Mean temperature of the warmest day	80·3°	77·85°
Coldest day	Jan. 23rd.	
Mean temperature of the coldest day	−8·2°	−1·50°
Date of the highest temperature	July 4th. / August 24th.	
Highest temperature	89°	91°
Date of the lowest temperature	Jan. 23rd.	
Lowest temperature	−16°	11·9°
Range of the year	105°	102°
Pluviameter.		
Total depth of *rain* in inches	17·791	28·30
Number of days on which *rain* fell	53	110
Month in which the greatest depth of *rain* fell	June.	September.
Greatest depth of *rain* in one month	4·41	3·55
Month with most *rainy* days	July.	October.
Greatest number of *rainy* days in one month	11	13
Day on which the greatest amount of *rain* fell	May 11th.	
Greatest amount of *rain* in one day	1·01	1·98
Total depth of *snow* in inches	57·6	
Number of days on which *snow* fell	26	
Month in which the greatest depth of *snow* fell	March.	
Greatest depth of *snow* in one month	19·5	
Month with most *snowy* days	January.	
Greatest number of *snowy* days in one month	7	
Day on which the greatest amount of *snow* fell	March 19th.	
Greatest amount of *snow* in one day	11	
Total precipitation in inches	23·551	

3. Experimental Department.

1. *Rain Gauge.*

A large rain gauge, rectangular in form and having an area of $\frac{1}{100}$ of an acre, has been erected during the year upon a central plot of the Experimental Field. The purpose of the rain guage has been two-fold: (1) To determine accurately the amount of the rainfall. (2) To collect rain in sufficient quantity to allow of its chemical analysis. It has been the careful examination of a work published last year, by Sir J. B. Lawes

and Dr. Gilbert, of England, "On the Amount and Composition of the rain and Drainage-waters collected at Rothamsted," that has made the determination of the amount and composition of the rain and drainage-waters of the Experimental Farm, appear not only desirable but highly necessary. Rain-gauges, having an area of $\frac{1}{1000}$ of an acre, have been in use on the Rothamsted estate since the winter of 1852-3; drain-guages of the same surface but of different depths (twenty inches, forty inches, and sixty inches) have been in use since the summer of 1870. Under the headings of Rain-gauge and Drain-gauge, we shall briefly discuss the more important results Sir J. B. Lawes and Dr. Gilbert have published in this work on the rain and drainage waters of Rothamsted.

They found, that the small rain-gauge gives a distinctly smaller rainfall on the average than the large gauges. Taking a mean of twenty-eight years (1853-80) the large and small guages compare as follows:

Comparison of the Large and Small Gauges (Mean of 28 Years).

	Mean Monthly Rainfall.		Deficiency of Small Gauges.	
	Large Gauges.	Small Gauges.	Actual.	Per Cent.
	Inches.	Inches.	Inches.	Inches.
January	2·590	2·263	0.327	12·6
February	1·728	1·508	0·220	12·7
March	1.693	1·399	0·294	17·4
April	2·008	1·803	0·205	10·2
May	2·329	2·149	0·180	7·7
June	2·451	2·272	0·179	7·3
July	2·704	2·533	0·171	6·3
August	2·643	2·440	0·203	7·7
September	2·638	2·403	0·235	8·9
October	3·089	2·784	0·305	9·9
November	2·345	2·113	0·232	9·9
December	2·084	1·861	0·223	10·7
Totals for year	28·302	25·528	2·774	9·8

On the whole year the small gauge showed on an average, 2·774 inches less rain than the large gauges, or a deficiency of 9·8 per cent.

Under the heading "The Composition of the Rain-water," a brief description of the sources of the more important matters dissolved by rain-water in its passage through the air is given. We quote the following:—

To make a complete analysis of rain-water, all the constituents, solid, as well as gaseous, held in solution, would have to be determined—the oxygen, nitrogen, and carbonic acid, the carbonate of ammonium, the chlorides, sulphates, and nitrates of sodium, calcium, and ammonium, and the mechanically held dust and soot.

The sources of the more important matters dissolved by rain-water in its passage

through the air are briefly and clearly given in the work of Sir J. B. Lawes and Dr. Gilbert, to which we have already referred :

"The *ammonia* of the atmosphere is derived from the decay of animal and vegetable matter, both on land and in the ocean, and from the combustion of fuel, especially coal ; the air of towns is much richer in ammonia than that of the country. According to M. Schlæsing, the ocean of the tropical regions is the most important source of atmospheric ammonia. At the high temperature of tropical latitudes the ammonia produced by the decay of organic matter diffuses freely into the atmosphere, and is carried by winds to all parts of the globe. In northern latitudes southerly winds are those richest in ammonia.

"The *nitric acid* in the atmosphere is due in part to electrical agency. Discharges of electricity in the air determine the combination of the nitrogen and oxygen, of which the atmosphere is composed, nitrous acid being formed ; ozone is at the same time produced, which is capable of oxidizing both nitrous acid and ammonia, nitric acid in each case resulting. A source of nitric acid, independent of electrical discharge, exists in the oxidation of ammonia by ozone and peroxide of hydrogen. As the latter substance is evolved when turpentine, and possibly other bodies, are oxidized in the air, the neighbourhood of a pine forest should be favourable to the formation of nitric acid in the atmosphere.

"The *sulphates* of the atmosphere are, according to Angus Smith, chiefly derived from the oxidation of the sulphur compounds evolved during the decay of animal matter. In towns the sulphates are much increased by the oxidation of the sulphurous acid contained in coal smoke.

"Chlorides are principally furnished by the sea, fine spray of salt water being carried long distances by high winds. To a small excent chlorides may also be furnished by the combustion of fuel."

To avoid the use of long decimals the amount of nitrogen existing as ammonia or nitric acid is given in "parts per million." To make the term "parts per million" clear, we may here state, "that one inch of water per acre weighs 226,263 pounds, consequently ten parts per million of nitrogen, or of any other constituent of rain or drainage water, correspond to 2·26 pounds per acre for each inch of rain or drainage."

The nitrogen existing as ammonia in the rain-water collected at Rothamsted in 1853-4 was determined by Sir J. B. Lawes and Dr. Gilbert. There was, during the first twelve months, a total rainfall of 29·014 inches, containing nitrogen in the form of ammonia equal to 5·20 pounds per acre. During fifteen months there was a rainfall of 34·41 inches, containing on an average 0·74 of nitrogen, as ammonia, per million of water.

During 1855 and 1856, Professor J. T. Way determined the quantity both of ammonia and nitric acid which mixed samples of water, representing the rainfall of each month, contained. On the average of the whole twenty-four months, Way found the proportion of nitrogen in the form of ammonia to be 1·03 per million of rain-water, that in the form of nitric acid only 0·12 per million. If we only regard these two years in which the nitric acid, as well as the ammonia, was determined, the total nitrogen becomes 7·29 pounds per acre, equivalent to forty-six and a-half pounds of ordinary nitrate of sodium.

The next analyses of Rothamsted rain-water, noticed in the work, are those made by Dr. E. Frankland. In seventy-one samples of rain and snow-water, and in seven samples of dew and hoar frost collected between April, 1869, and May, 1870, Dr. Frankland determined the total solid matter dissolved in the water, the quantity of carbon and nitrogen existing in the form of organic matter, and the ammonia, nitric acid, chlorine, and *hardness of the water*. To avoid the dust, the excrements of birds, and the small insects that sometimes collect upon the surface of the gauge, the gauge was in some instances washed with distilled water before the samples of rain were collected for analysis.

"Average Composition of Rain-water Collected both from a Washed Gauge, and without Special Precaution, in Parts per Million:—

	Total solid matter.	Carbon in organic matter.	Nitrogen as				Chlorine.	Hardness, or Lime Magnesia.
			Organic matter.	Ammonia.	Nitrates and Nitrites.	Total Nitrogen.		
From washed gauge, 22 samples...	28·0	0·64	0·16	0·30	0·12	0·58	2·1	4·0
Without special precaution, 47 samples	36·6	1·03	0·20	0·41	0·15	0·76	3·6	4·8"

The average amount of ammonia found by Dr. Frankland is equal to only 0·37 of nitrogen per million. The mean of the earlier analyses is 0·95 of nitrogen per million. It is thought that Dr. Frankland's results cannot properly be compared with those obtained by the chemists who preceded him, seeing his samples of rain-water did not include every fall of rain in a given period, but consisted of selected samples only. It is further thought, that Dr. Frankland's determination of the ammonia by the Nessler process, is more accurate than the old method of fractional distillation of the water and the determination of the ammonia in the distillate with a standard acid and alkali. The last consideration is probably the accurate one, as the determinations made quite recently at Rothamsted confirm Dr. Frankland's results.

It has been found that the composition of rain-water greatly depends on the quantity of the fall. The proportion of each constitutent tends to diminish as the amount of rainfall increases, the decrease being most rapid in the case of chlorides and least marked in the case of the organic elements. It has further been found that the amount of total solid matter dissolved in the rain-water is considerably greater in summer than in winter. In a majority of cases the ammonia is greater in summer than in winter. The nitric acid is also in every case greatest in summer time. The most striking difference in the two seasons occurs in the organic matter, the proportion of nitrogen to carbon being different. In summer the carbon is generally greater than in winter, while the nitrogen in summer is less than in winter.

In the explanation of this difference it is assumed that a larger proportion of fresh vegetable matter is present in the rain-water of summer than in that of winter.

Dr. Frankland insists that the south-east wind produces at Rothamsted rain richest in ammonia, and the north-east wind rain richest in chlorine. This conclusion of Dr. Frankland is regarded as probably correct. London city, lying to the south-east of the rain-gauge, will give to the south-east wind, naturally rich in ammonia, additional ammonia; and the North Sea, lying to the north-east of the rain-gauge, will naturally supply the largest proportion of chlorine.

It is interesting to notice the range in the amount of chlorides present in rain-water. The average proportion of chlorine in the rain-water of Rothamsted, during a period of forty-three months, was 1·75 per million. In the course of a year, (average of three and a-half years) the quantity of chlorine brought by rain on an acre of land was 13·42 lbs., for a rainfall of 34·038 inches, equal to 22·12 lbs. of pure common salt. At Cirencester, about thirty-five miles distant from the Bristol Channel, the mean rainfall for a year has been 33·571 inches, the chlorine amounting to 4·28 parts per million, equal to 53·66 lbs. of pure common salt per acre.

We hope the following statement of the amount of ammonia and nitric acid supplied to the soil in rain in the course of a year, in various parts of the continent of Europe, will be of interest to our readers.

Station.	Rainfall.	Nitrogen per million, as		Total Nitrogen per acre.
		Ammonia.	Nitric Acid.	
	inches.			lbs.
Kuschen, 1864-5	11·85	0·54	0·16	1·86
" 1865-6	17·70	0·44	0·16	2·50
Justerburg, 1864-5	27·55	0·55	0·30	5·49
" 1865-6	23·79	0·76	0·49	6·81
Dahme. 1865	17·09	1·42	0·30	6·66
Regenwalde, 1864-5	23·48	2·03	0·80	15·09
" 1865-6	19·31	1·88	0·48	10·38
" 1866-7	25·37	2·28	0·56	16·44
Ida-Marienhütte; mean of 6 years, 1865-70	22·65	....	....	9·92
Proskau, 1864-5	17·81	3·21	1·73	20·91
Florence, 1870	36·55	1·17	0·44	13·36
" 1871	42·48	0·81	0·22	9·89
" 1872	50·82	0·82	0·26	12·51
Vallombrosa, 1872	79·83	0·42	0·15	10·38
Montsouris, Paris, 1877-8	23·62	1·91	0·24	11·54
" " 1878-9	25·79	1·20	0·70	11·16
" " 1879-80	15·70	1·36	1·60	10·52
Mean of 22 years	27·03	....	....	10·23

It is interesting to notice how these widely varying determinations, some of which have been made in the vicinity of towns, give a mean of 10·23 lbs. of combined nitrogen annually supplied per acre by rain, with a mean rainfall of 27·03 inches.

In July last, in answer to a communication of inquiry from us, we received from the chemist of Rothamsted, Dr. Gilbert, a very courteous letter, in which the structure of the rain-gauge itself, and especially of the *gauge-cylinders* was fully explained. In accordance with his directions, the *rain-gauge collector* consists of a wooden frame lined with lead, with a vertical rim of plate glass, three inches deep and three-eighths inch thick, bevelled outwards. The angles are also bevelled or mitred and cemented; the rim is further held in place by an angle fillet of wood outside. He informed us, from their experience at Rothamsted, that the wooden frame was liable to swell and warp, and that lead was sometimes found in the rain-water. "If it were practicable it would be better if the whole collector could be made of glass. But there would be not only great difficulty in first construction, but great liability to accident. The question is whether copper, though expensive in the first instance, would not be the best."

As to the gauge cylinders, Dr. Gilbert sent us a sketch (side-view) of one with its

fittings and dimensions, also, the lower end of a broken rain-gauge tube, showing the graduation. The gauge-cylinders are made of strong galvanized iron, and are fitted with moveable lids. The height is twenty-seven inches inside, the diameter, twelve and five-eighths inches inside.

"The tube fits into a piece of elbow iron gas-piping, fixed quite at bottom of the cylinder. The bore of the iron pipe is, I believe, one and a-quarter inch ; it is fitted with a brass ring or rim screw threaded outside. On the flat top of this ring (which has an orifice to receive the tube about one-quarter inch wider than the outside measure of the tube) is placed a thick caoutchouc washer, then a flat ring of brass with orifice one-eighth inch larger than the tube, and then the cap with ferrule screw to fit the outside screw of the ring, is screwed on, the glass tube having been first properly placed. The cap has also a hole to receive the tube large enough to allow of play, the caoutchouc washer making the joint. All being fitted, and the cylinder placed perfectly level, 11 lbs., 5 ozs. of water at 60° F. is poured in, and the height marked on the glass, and this mark represents 0·05 inch on the $\frac{1}{1000}$ acre area. 11 lbs., 5 ozs. more water is then put in, and the point marked, and so on until ten lots have been put in. The amount then representing 0·50 or one-half inch. With these land marks, the tube is then graduated. The main divisions will each represent 0·01 or $\frac{1}{100}$ inch ; these are subdivided into five, and as the water can be read to half a division, $\frac{1}{1000}$ inch can be read. All quantities below 0·05 are drawn out of the tap and measured in a small cylinder, constructed to measure 0·10 inch of dimension given on the plan, and the tube is graduated to 0·001."

Before this letter from Dr. Gilbert had had time to reach us, in accordance with a wish expressed by Professor Brown, letters had been written to Canadian and American glass manufacturers, asking them if glass cylinders accurately graduated and furnished with necessary stop cocks, etc., could be constructed. As negative answers were received in each case, it was with no little pleasure that we adopted the simple yet ingenious method employed at Rothamsted. It is still the intention of Prof. Brown, when a suitable opportunity occurs, of having glass cylinders made.

2. The Drain-Gauges or Lysimeters.

The larger part of the work of Sir J. B. Lawes and Dr. Gilbert, which we have been reviewing, is devoted to the amount and composition of the drainage-waters at Rothamsted. The Rothamsted drain-gauges are three in number, and consist of retangular plots of soil having the same surface as the large rain-gauge, namely, $\frac{1}{1000}$th of an acre. The depth of the soil varies. In the first gauge, the depth is twenty inches ; in the second, it is forty inches ; and in the third, sixty inches. The gauges were constructed in the summer of 1870, and in the following manner :—

"In order to obtain a *natural* drainage, it was of primary importance that the soil should be in a perfectly natural condition of consolidation, neither more porous nor more condensed than the ordinary field soil. To accomplish this object a deep trench was dug along the front of each intended gauge ; the mass of soil was then gradually undermined, at the depth previously determined ; and plates of cast iron, eight inches wide and perforated with holes, were introduced to support the soil as the work proceeded. This perforated iron bottom was finally strengthened by transverse iron girders, and the ends of the plates and girders supported by brickwork on three sides of the intended gauge. The soil being now supported from beneath, trenches were made one by one on the three remaining sides of the block of soil to be isolated ; walls of brick, laid in cement, four and one-half inches thick, were built against the soil, and the trenches were again filled in with earth. The mass of soil was in this manner built in on all sides with brick and cement. The surrounding walls were carried three inches above the level of the soil, the edges at the top being made to slope outwards." The water is collected in galvanized iron cylinders, fitted with external gauge tubes, similar in structure to those used for the large rain-gauge.

The soil of Rothamsted is described as a somewhat heavy loam with a subsoil of clay mixed with flint and lying on chalk.

In digging the trenches round the rain-gauges, it was found, that the ordinary soil is not a uniform porous mass "which simply becomes saturated with water and then parts with its surplus by drainage." Besides the shallow surface cracks that remain partially open after dry weather has ceased, there are deeper channels that have been produced by the roots of plants and by the burrowing of worms. Barley roots were observed penetrating the soil to a depth of fifty and even sixty inches. In the decay of such roots, small open channels are left through which drainage can take place. Worms have not unfrequently appeared on the collecting funnel of the twenty-inch gauge, and much more rarely on the collecting funnels on the forty-inch and sixty-inch gauges.

The drainage-water from the soil may consist of two kinds:—

(1) Of rain-water which has passed with but little alteration in composition down the open channels of the soil; or

(2) Of water which has been discharged from the pores of a saturated soil. The drainage through the open channels of the soil contains a much smaller proportion of soluble salts than the true drainage of the soil.

As the surface soil dries, water will be gradually drawn from the subsoil and be itself in turn evaporated. "The depth to which the subsoil will be dried by this loss of water through capillary attraction will depend on the mechanical texture of the soil; the depth will be greater in the case of a loam or clay than in the case of a soil of more open texture, the height to which water can be raised by capillary attraction being in proportion to the fineness of the spaces through which it passes."

We give the average annual rain-fall and drainage at Rothamsted through twenty, forty and sixty inches of soil, during the periods 1871–74, 1875–80, and 1871–80:—

	Rainfall Inches.	Drainage in Inches.			Drainage in 100 Rainfall.		
		20-Inch Gauge.	40-Inch Gauge.	60-Inch Gauge.	20-Inch Gauge.	40-Inch Gauge.	60-Inch Gauge.
Four years, 1871-74.....	27·344	9·683	9·476	7·753	35·4	34·7	28·4
Six years, 1875-80	34·189	16·944	18·544	16·899	49·6	54·2	49·4
Ten years, 1871-80	31·451	14·040	14·916	13·241	44·6	47·4	42·1

Expressed in percentages of the rainfall, the drainage in summer has varied from 7·9 to 47·6, with a mean of 26·8 per cent.; the drainage in winter from 39·8 to 80·1, with a mean of 61·9 per cent.; and the drainage of the whole year from 21·7 to 60·5, with a mean of 43·4 per cent.

The amount of evaporation taking place from a bare uncropped soil depends, (1) on the temperature of the soil, (2) on the temperature and dryness of the air, (3) on the amount of wind, (4) on the amount and distribution of the rain. Drainage is, in fact, merely *the excess of rainfall over evaporation.* Plants, during their growth by the rapid transpiration of water through their leaves, are very active in evaporating the water of the soil. "A crop of manured hay of 29½ cwts. had removed from the soil at least two inches, and another manured crop of 56¼ cwts. at least 3·2 inches more water than an unmanured crop of 5¾ cwts. In the case of a crop of barley grown on the same field in which the drain-gauges were afterwards established, the crop had apparently removed from the soil about nine inches more water than had evaporated from the adjoining bare fallow.

Under the heading "The Composition of the Drainage-waters," nitrification or the formation of nitrates is discussed. It was Schlæsing and Müntz who discovered the mode in which the nitrification takes place. A living ferment contained in the soil is capable of oxidizing ammonia and other nitrogenous bodies into nitric acid. "The nitrifying ferment is apparently present in all fertile soils; it requires for its activity *a sufficient supply of water and air*, and also *some salifiable base, as chalk; a certain degree*

of warmth is also necessary. No nitrification will take place in a dry soil; the production of nitrates will increase in activity as the soil becomes wetter up to the point at which the water begins to interfere with the free aëration of the soil. Nitrification is at a standstill near the freezing-point, and gradually increases in activity as the temperature rises, reaching its maximum of energy about 98° Fahr. (37° C.) At a higher temperature it diminishes in activity, and ceases altogether at 131° (55° C.). The process of nitrification is probably chiefly confined to the surface soil, where nitrogenous matters are most abundant, and the supply of air greatest; it will proceed with greatest energy in summer-time, and be especially active during a wet summer. The nitrate produced in soil is chiefly nitrate of calcium."

The work under review gives a very intelligent classification of the substances that may be dissolved by rain :—

(1) Substances freely diffusible within the soil. The freely diffusible acids are hydrochloric, nitric, and to a less extent sulphuric acid; the most readily diffusible bases are soda and lime. By combining these diffusible acids and bases, the chlorides and nitrates of sodium and calcium, and, to a less extent the sulphates, are readily diffusible salts, and may be easily extracted from a soil, if sufficient water be applied;

(2) Substances for which soil exerts more or less attraction, and which are therefore not freely diffusible. "Most fertile soils possess a great retentive power for phosphoric acid, ammonia, and potash, and these substances are consequently found in drainage-waters in minute quantity, except under very special circumstances. In the case of such substances, the small solvent action of rain results rather in their more equable distribution throughout a limited area of soil than in their removal from it."

We give Dr. Frankland's analysis of drainage-waters from the three drain-guages, twenty, forty, and sixty inches deep, in parts per million :—

Date of Collection.	Total Solid Matter.	Carbon in Organic Matter.	Nitrogen as				Chlorine.	Total Hardness.
			Organic Matter.	Ammonia.	Nitrates and Nitrites.	Total Nitrogen.		
Soil 20 Inches Deep.								
Nov. 20-23, 1870	632·8	1·08	0·45	0·00	49·36	49·81	21·5	129
Dec. 15-17, 1870	400·4	1·84	0·64	0·00	31·76	32·40	38·0	146
Oct. 30-31, 1872	302·4	1·14	0·45	0·01	26·36	26·82	6·0	166
Feb. 25-26, 1873	180·0	1·42	0·45	0·02	6·07	6·54	9·5	120
April 2-30, 1874	274·4	1·74	0·75	0·20	21·46	22·41	9·5	137
Mean	358·0	1·44	0·55	0·05	27·00	27·60	16·9	140
Soil 40 Inches Deep.								
Nov. 20-23, 1870	362·4	1·47	0·49	0·00	23·45	23·94	28·6	134
Dec. 15-17, 1870	386·0	2·35	0·82	0·00	23·89	24·71	30·0	131
Oct. 30-31, 1872	273·2	0·96	0·32	0·00	21·06	21·38	8·0	166
Feb. 25-26, 1873	192·4	1·27	0·26	0·01	7·89	8·16	9·5	97
April 2-30, 1874	230·8	1·17	0·54	0·10	16·02	16·66	9·5	120
Mean	289·0	1·44	0·49	0·02	18·46	18·97	17·1	130
Soil 60 Inches Deep.								
Nov. 20-23, 1870	392·4	1·27	0·42	0·00	28·53	28·95	26·0	155
Dec. 15-17, 1870	366·8	3·71	1·16	0·21	24·89	26·26	21·5	35
Oct. 30-31, 1872	326·8	0·98	0·37	0·01	23·65	24·03	10·5	126
Feb. 25-26, 1873	223·6	1·68	0·40	0·02	7·59	8·01	9·5	104
April 2-30, 1874	264·0	0·98	0·42	0·16	17·32	17·90	9·5	130
Mean	314·7	1·72	0·55	0·08	20·4	21·03	15·4	110

"Looking at these analyses generally, we see that ammonia is either absent or occurs in very small quantity. The amount of organic matter dissolved in the water is but small; it is increased when the water is turbid; it is in all cases highly nitrogenous. The mean ratio of organic nitrogen to carbon in the drainage-waters from the three gauges is 1: 2·6, 1: 2·9, and 1: 3·1, the proportion of carbon apparently increasing with the depth of the soil." In turbid waters the proportion of carbon is highest. Turbidity in drainage-water being a sign that direct channel drainage has occurred, and that matter has been brought immediately from the surface. Dr. E. J. Mills has found that the relation between the nitrogen and carbon of the organic matter found in clear well and drainage-waters is constant. "He considers that the slow oxidation which organic matter undergoes in a soil finally reduces all forms of organic matter to a few simple compounds, in which the carbon and nitrogen have the relation $\frac{C}{12} : \frac{N}{3}$ $\frac{C}{12} : \frac{N}{4}$ or $\frac{C}{12} : \frac{N}{5}$; in the drainage-waters we are now considering the composition of the organic matter corresponds with the second of the above ratios." Little is known of the part these nitrogenous organic bodies possibly play in plant nutrition.

The large proportion of chlorides is thought to be probably due to a previous manuring with guano. The "hardness" represents the amount of lime present in the waters. It is interesting to notice that the drainage from the 40-inch gauge is weaker than that from either of the others, the order of strength being in fact 20, 60, 40.

"The maximum richness in nitrates occur in early autumn drainage, the proportion diminishing through winter, and reaching a minimum in spring." "In early autumn the drainage from the 20-inch gauge is richest in nitrates," but "in late winter and spring the drainage from the 60-inch becomes generally the richest."

These facts are easily explained if we remember—

(1) That it is in summer that the nitrates are most abundantly produced in the surface soil.

(2) That little drainage occurs in summer time, owing to the high rate of evaporation.

(3) That in autumn, drainage becomes active, and the washing out of the nitrates commences.

(4) That as the nitrates are most abundant at the surface they, after being displaced by rain, require time for diffusion before they can appear in quantity in the drainage-water. This further explains why drainage from the shallowest soil is the first *to show the maximum* contents of nitrates. Continuous wheat cropping without manure is found to lower the proportion of nitrates in the drainage-water, the crop actively appropriating the nitrates formed in the soil. "So complete is the appropriation of nitrates by the wheat crop, that during the time of active growth, and for some time after, no nitric acid, or a trace only, can be found in the drainage-water from several of the plots in Broadbalk."

A brief *summary* of the amount and composition of rainfall, drainage-waters from land unmanured and uncropped, drainage-waters from land manured and cropped with wheat, and quantity of nitrogen lost per acre by drainage, is given by Sir J. B. Lawes and Gilbert at the end of their work. We shall give from this summary a few of the more interesting items:—

(1) "The quantity of nitrogen as nitrates annually removed in the drainage-waters has varied from 31·78 lbs. to 57·95 lbs. per acre. The average of four years, 1877-8 to 1880-1, is 41·81 lbs., equal to 268 lbs. of ordinary nitrate of sodium per acre.

(2) "The amount of chlorine in the drainage from the drain-gauges, is approximately the same as in the rainfall.

(3) "The advantages of a bare fallow is largely due to the production of nitrates in the soil; in fields in bare fallow at Rothamsted, 50 lbs. per acre of nitrogen as nitrates have been found at the end of summer in the first twenty inches. *If followed by a wet winter*, bare fallow must result in a serious loss of soil nitrogen.

(4) "The annual average of loss of lime and magnesia by drainage from the continuously unmanured wheat plot is apparently about 223 lbs.; where 400 lbs. ammonium salts are applied, the loss is 389 lbs.; where sulphates of sodum, potassium, and magnesium are also added, the loss is still greater, the two last-named salts exerting most influence. Nitrate of sodium does not apparently increase the loss of lime.

(5) "When ammonium salts are applied to land, the ammonia is at first retained by

the soil, while the sulphuric acid or chlorine passes into the drainage water, chiefly as calcium salts.

(6) "The conversion of ammonia into nitric acid commences almost immediately after the application of ammonium salts to wet soil. The conversion is apparently complete in a few weeks, if wet weather follows. The nitrogen of rape-cake is more slowly converted into nitric acid.

(7) "The drainage-waters from plots manured with ammonium salts are richest in nitrates shortly after their application. With 400 lbs. of ammonium salts per acre applied in March, the April drainage-waters have averaged 6·7 lbs. of nitrogen (=42·8 lb. nitrate of sodium) per inch of drainage.

(8) "In summer the drainage-waters from plots receiving 200–400 lbs. ammonium salts contain *little* or *no nitrates*, if *phosphates* and *potash* have been supplied; but with an excess of ammonia, or a deficiency of ash constituents, the nitrates produced are imperfectly assimilated by the crop, and appear in the drainage-water.

(9) "Reckoned over thirty years, *not quite one-third* of the *nitrogen* supplied by manure was recovered *in the increase of crop* under favourable conditions as to mineral manure and growth, and *very much less* when there was a *deficiency* of *potash* and *phosphoric* acid, and defective growth accordingly.

(10) "With 400 lbs. of ammonium salts, and the most liberal mineral manure, there was the *maximum* amount of nitrogen recovered in the crop, and the *minimum* amount in the drainage; but with the ammonium salts used alone, there was the *minimum* amount in the crop, and the *maximum* amount in the drainage.

(11) "When farmyard manure is largely used, there is sometimes considerable loss of nitrogen, due to the decomposition of nitrogenous organic matter, and the evolution of free nitrogen, or when the soil is saturated with water, or imperfectly aërated, there may be destruction of nitric acid and evolution of free nitrogen."

In July of last summer we visited the New York Agricultural Experiment Station situated at Geneva, and carefully examined the lysimeters in use by Dr. Sturtevant, the director of the station. We found the Geneva drain-gauges neater and more compact than those of Rothamsted. They cover an area of $\frac{1}{10\,000}$th of an acre, and are of uniform depth, namely, three feet. The drainage experiments conducted by Dr. Sturtevant, at Boston, before he became director of the Geneva Station, were made with lysimeters of this area. We give a condensed form of the Boston results:—

Years 1876-7-8-9.

	Rainfall, Inches.	Percolation, Inches.	Evaporation, Inches.
January, February, March, April.			
Average	16·84	2·768	83·5
May, June, July, August.			
Average	13·77	0·589	95·7
Sept., Oct., Nov., Dec.			
Average	14·70	3·401	76·8
For the twelve months.			
Average	45·34	6·759	85·1

Under the head evaporation is included the difference between rainfall and percolation. The soil experimented with is described, as a sandy or gravel loam, in so poor an

agricultural condition that, "a sod would produce a short half ton of hay per acre in a favourable season." It has been assumed from these figures, that percolation is practically *nil* during the growing season, and that leaching, so much dreaded by the farmer, is under farm conditions, not to be practically feared.

After our return tc Guelph, we held a consultation with Professor Brown, and decided to build our lysimeter after the Geneva pattern. It was the greater compactness of its form and the comparatively small cost involved in its construction, that principally lead us to prefer the Geneva drain-gauge to the one of Rothamsted. In reply to a private note from us, in which Dr. Sturtevant was requested to send us a detailed statement of how his lysimeter had been built, we received the following prompt and courteous answer :—

"In the first place strong oak frames were made of two inch plank—25$\frac{4}{10}$ inches square, internal diameter, and three feet deep ; these frames were strongly bound at the corners with iron, besides being dove-tailed together. These frames were then lined with sheet copper, tacked in place with heavy copper tacks at frequent intervals, and the heads of the tacks counter-sunk. The copper was allowed to project an inch above and below the frame, and the projection was turned down and securely tacked. A tinsmith then soldered all the joints, and covered also the heads of the tacks with solder. Four pieces of angle-iron were then procured, and one edge ground sharp on the grindstone. These were secured on the lower edge of the frame, the cutting edge in line with the interior surface of the frame. These frames were then set upon the sod, heavily weighted upon the top, and were driven down evenly by heavy mauls striking the two diagonal corners at the same time. A trench is kept dug upon the outside a little in advance of the sinking of the frame, and by means of a trowel the earth is kept cut away close to the cutting edge, in order to allow the bottom to pass down without resistance. This whole operation of sinking is one requiring much patience, and is easily done if not hurried. When sunk to the proper depth, *i.e.*, when the sod is even to the surface of the frame, a plate of boiler iron is forced under the bottom of the frame by means of a jack-screw, skids extending on either side to preserve the plate parallel. When this cutting plate has separated the prism, a chain is passed around it, and the box is lifted from the hole, and inverted alongside. The angle-iron is now to be unscrewed, the soil to be trimmed away even with the bottom of the frame, a copper bottom laid on, and the copper edge, which had been previously turned over the frame, now turned over the bottom and securely soldered. A pipe from the centre of the bottom enables the water to be collected after the apparatus is put in position."

To calculate the amount of water evaporated from growing sod, from a bare surface, and from a stirred surface, respectively, the Geneva Station has three lysimeters :

Lysimeter No. 1 retaining the sod upon its surface ; No. 2 having its surface kept bare and undisturbed ; No. 3 having its surface kept pulverized during the open season to the depth of an inch or two by frequent stirring with a trowel.

The soil contained within these lysimeters Dr. Sturtevant describes as follows : "A dark clay loam, moderately friable for the first eight inches ; below this and sharply defined from it, is a bed of heavy clay, dark red in colour, granular and not very tenacious, about a foot thick ; below this a bed of clay about a foot thick, of similar colour to the last, but quite compact and tenacious ; below this four inches, of a peculiar, soapy soil ; below this last, but not included in the lysimeter boxes, was a strong clay hard pan."

To allow settling and to wash out the accidental impurities that may have come from the acid used in soldering, Dr. Sturtevant does not intend to keep records of drainage until next year. The following figures for the year 1882 have been published :

PERCOLATION FROM LYSIMETERS IN INCHES.

Lysimeter.	Aug.	Sept.	Oct.	Nov.	Dec.
No. 1.	0·00	0·00	0·00	0·00	0·001
No. 2.	0·135	0·001	trace	0·009	0·578
No. 3.	0·575	0·284	0·001	0·011	0·559
Rainfall.....	2·371	1·251	0·621	1·220	0·551

A marked influence in favour of the effect of stirring the soil upon conserving the moisture to land is here visible, No. 3 kept stirred, holding more water than did the others, required less of the rainfall for saturation and subsequent percolation. The growing sod evaporated more water than did the bare soil, and the bare soil more than the stirred soil.

According to the directions received from Dr. Sturtevant, three lysimeters have been built and placed on one side of the large rain-gauge. The lysimeters sit upon a rocky bottom, their surface being on a level with that of the experimental field. The pipes which pass from the bottom of the lysimeters are carried into the subterranean alcove of the large rain-gauge. Carboys similar in structure to those of the large rain-gauge, and kept under each pipe, will enable us to collect all the water which drains through, and at the same time measure it in thousandths of an inch. About the top of the frames an edging of hard brass, strickly defining the area and one inch high, is fastened. Hence all the rainfall over this area is compelled to enter the soil, and by measuring the amount which percolates we can account for the balance through evaporation.

The soils of the lysimeters have been taken from the Experimental Field of the Farm. Great care has been observed in their selection. They are as nearly as possible identical in physical and chemical properties; they further, fairly represent the soil of the entire field. The surface soil is a sandy loam eight inches in depth—the humus being abundant. The subsoil consists of three distinct layers: First, is a firm clay loam ten inches deep, having a reddish tinge and a slight sprinkling of gravel; second is a gravel loam fourteen inches deep, the gravel varying from one inch to the $\frac{1}{10}$ of an inch in diameter; third, a layer of pure building sand four inches deep.

Lysimeter.

No. 1 will have sod grown upon its surface; No. 2 will be treated as a bare fallow. To Lysimeter No. 3 a manure will be applied and a crop grown. The drainage-waters passing through all three lysimeters will be collected, measured, and their composition determined by analysis. In Lysimeter No. 2 we shall ascertain for Ontario the loss of nitrates in a bare fallow. It is thought by some that during our frequently dry falls and our frosty winters, little or no loss of nitrates occur. Knowing in Lysimeter No. 3 the substances applied as manure and removed in the crop and drainage-water, much valuable information must be obtained, if different manures are applied and different crops grown.

While writing this three other lysimeters are in process of erection. They will be placed on the other side of the large rain-gauge, and will contain soils that differ both physically and chemically. Lysimeter No. 4 will contain a light sandy soil; No. 5, a heavy clay-soil; No. 6, a loam. Professor Brown intends to test different modes of farming with these lysimeters; in other words the manure and crop will be. each year, in each case, the same, the treatment will, each year, differ.

3.—*Field Experiments.*

As a means of studying the effects of fertilizers and the feeding capacities of plants, we intimated in last year's Report, our intention of adopting the system of "Co-operative Experimenting," which was submitted to the Department of Agriculture, Washington, D. C., March 27th, 1882 by Prof. W. O. Atwater. It is provided in this system, that the fertilizing materials may be used separately, two by two, and altogether. Before we proceed to give the results of this year's experiments, we shall briefly review the conditions under which the fertilizers have been used.

Nitrogen was used in three distinct forms:—

First, in the form of nitric acid. 1. Nitrate of soda.
Second, in the form of ammonia. 2. Sulphate of ammonia.
Third, in the form of organic nitrogen. 3. Steam dried blood.

Three rations were used, full, two-thirds, and one-third.

	RATION.		
	FULL. lbs. per acre.	TWO-THIRDS. lbs. per acre.	ONE-THIRD. lbs. per acre.
1. Nitrate of soda	450	300	150
2. Sulphate of ammonia	343	228	114
3. Dried blood	660	440	220

There was also used a "nitrogen mixture," consisting of equal parts of nitrate of soda, sulphate of ammonia, and dried blood, and containing the same percentage of nitrogen as nitrate of soda and hence the same rations.

Phosphoric acid was likewise employed in three different forms of combination—soluble, precipitated or reverted, and insoluble. There was used for the soluble phosphoric acid, dissolved bone black with sixteen per cent. $P_2 O_5$; for the *precipitated*, a high grade superphosphate with equal weight of chalk, making a precipitated phosphate with sixteen per cent. $P_2 O_5$; for the *insoluble*, fine bone dust with 25 per cent. $P_2 O_5$.

	RATION.		
	FULL. lbs. per acre.	TWO-THIRDS. lbs. per acre.	ONE-THIRD. lbs. per acre.
1. Soluble phosphate	600	400	200
2. Precipitated phosphate	600	400	200
3. Insoluble phosphate	400	267	133

Potash was used in the form of muriate of potash, the full ration being 200 pounds to the acre, two-thirds ration, 133 pounds, and one-third ration sixty-seven pounds.

In applying these fertilizers separately and two by two, two-third rations were used; in applying them altogether, two-third rations of two of them were added to the several rations of the third. We hoped in this way to discover the heightened effect on the one fertilizer by the addition of the other fertilizers. The sulphate of lime group has been suggested in order to ascertain if the effect of the super-phosphate be due in part to the sulphate of lime always present in it.

In the following table the number of the plots, the fertilizers, and the quantities per $\frac{1}{10}$ acre, are given:—

FIRST TWO ACRE SET—Nitrogen and Potash.

Number of Plot.	Fertilizers.	Quantities per One-Tenth Acre Plots.
	I.—Preliminary Group.	Pounds.
40	Nitrate of soda, two-thirds ration	30·0
39	Superphosphate " "	40·0
38	Muriate of potash " "	13·3
37	Nitrate of soda, Superphosphate, mixed minerals	30·0 40·0
36	Nitrate of soda, Muriate of potash "	30·0 13·3
35	Superphosphate, Muriate of potash "	40·0 13·3
	II.—Nitrate of Soda Group.	
34	Mixed minerals as No. 35 Nitrate of soda, one-third ration	53·3 15·0
33	Mixed minerals as No. 35 Nitrate of soda, two-thirds ration	53·3 30·0
32	Mixed minerals as No. 35 Nitrate of soda, full ration	53·3 45·0
	III.—Sulphate of Ammonia Group.	
31	Mixed minerals as No. 35 Sulphate of ammonia, one-thirds ration	53·3 11·4
30	No manure	
29	Mixed minerals as No. 35 Sulphate of ammonia, two-thirds ration	53·3 22·8
28	Mixed minerals as No. 35 Sulphate of ammonia, full ration	53·3 34·3
	IV.—Dried Blood Group.	
27	Mixed minerals as No. 35 Dried blood, one-third ration	53·3 22·0
26	Mixed minerals as No. 35 Dried blood, two-thirds ration	53·3 44·0
25	Farm-yard manure	15 tons per acre.
24	Mixed minerals as No. 35 Dried blood, full ration	53·3 66·0
	V.—Muriate of Potash Group.	
23	Mixed minerals as No. 37 Muriate of potash, one-third ration	70·0 6·7
22	Mixed minerals as No. 37 Muriate of potash, two-thirds ration	70·0 13·3
21	Mixed minerals as No. 37 Muriate of potash, full ration	70·0 20·0

SECOND TWO ACRE SET—Phosphoric Acid and Sulphate Lime.

Number of Plot.	FERTILIZERS.	Quantities per One-Tenth Acre Plots.
	I.—Preliminary Group.	Pounds.
41	"Nitrogen mixture," two-thirds ration	30·0
42	Superphosphate, " "	40·0
43	Muriate of potash, " "	13·3
44	Nitrogen mixture, " "	30·0
	Superphosphate, " "	40·0
45	No manure	
46	Muriate of potash, two thirds ration	13·3
	Superphosphate, " "	40·0
47	Nitrogen mixture, } Basal Mixture. {	30·0
	Muriate of potash, } Basal Mixture. {	13·3
	II.—Soluble Phosphoric Acid Group.	
48	Basal mixture as No. 47	43·3
	Superphosphate, one-third ration	20·0
49	Basal mixture as No. 47	43·3
	Superphosphate, two-thirds ration	40·0
50	Farm-yard manure	
51	Basal mixture as No. 47	43·3
	Superphosphate, full ration	60·0
	III.—Precipitated Phosphoric Acid Group.	
52	Basal mixture as No. 47	43·3
	Precipated Phosphate, one-third ration	20·0
53	Basal mixture as No. 47	43·3
	Precipitated phosphate, two-thirds ration	40·0
54	Basal mixture as No. 47	43·3
	Precipitated phosphate, full ration	60·0
	IV.—Insoluble Phosphoric Acid Group.	
55	Basal mixture as No. 47	43·3
	Bone dust, one-third ration	13·3
56	Basal mixture as No. 47	43·3
	Bone dust, two-thirds ration	26·7
57	Basal mixture as No. 47	43·3
	Bone dust, full ration	40·0
	V.—Sulphate of Lime Group.	
58	Basal mixture as No. 47	43·3
	Sulphate of lime, one-third ration	7·5
59	Basal mixture as No. 47	43·3
	Sulphate of Lime, two-thirds ration	15·0
60	Basal mixture as No. 47	43·3
	Sulphate of lime, full ration	22·5

The plots that have been used in testing the artificial fertilizers, according to the co-operative system, make up ranges II. and III. of the Experimental field.

The soil, though not rich, is by no means poor; not much farm-yard manure has ever been applied to it. It was broken from sod in the fall of 1881, and was summer-fallowed the following summer. In the spring of 1883, it was twice cultivated and once harrowed. On May 1st and 2nd, six pecks per acre of white Russian wheat were drilled in; on May 2nd, the artificial fertilizers were sown by hand. On May 15th, the blades commenced to appear above ground, a difference in their growth not becoming perceptible until June 12th. On June 23rd and 27th, the injurious effects of the wet weather were everywhere apparent, parts of many of the plots having turned yellow. On July 11th, rust was distinctly visible on the leaves of the wheat of all plots; on July 25th, the amount of rust was great, all the plots apparently suffering alike.

In the following table, prepared by Mr. Shuttleworth, foreman of the Experimental Department, under the direction of Professor Brown, the results obtained from the different plots are given :—

1ST TWO ACRE SET.—Result of testing special

Date of Ripening.	Market Grain, Bushels per acre.	Market Grain, Pounds per acre.	Small Grain, Pounds per one-tenth acre.	Total pounds per acre.	Weight per measured bushel.	Straw, pounds per acre.	Total Weight of crop per acre.
Aug. 28.....	9.291	497.5	6	557.5	49.8	2512.5	4070
" 28	10.958	602.5	5.5	657.5	54.5	2762.5	3420
" 29.....	11.333	630	5	680	47.3	2870	3550
" 29.....	12.625	697.5	6	757.5	54.8	3182	3940
" 28.....	15.541	892.5	4	932.5	50.8	3377	4310
" 28	8.541	467.5	4.5	512.5	52.6	2237.5	2750
" 28.....	11.166	640	3	670	54.3	3020	3690
" 28.....	8.208	442.5	5	492.5	51	2457.5	2950
" 29.....	15.125	837.5	7	907.5	55	3532.5	4440
" 29.....	15.375	862.5	6	922.5	54.2	3987.5	4910
" 29.....	16.708	942.5	6	1002.5	55.2	4007.5	5010
" 28.....	16.791	935.6	7.5	1007.5	53.8	4302.5	5310
" 28.....	16.166	910	6	970	53.2	4720	5690
" 28.....	17.208	982.5	5	1032.5	54.5	4362.5	5395
" 28.....	17.791	1027.5	4	1067.5	54.6	4362.5	5430
" 28.....	16.875	972.5	4	1012.5	55.2	4777.5	5790
" 28.....	23.291	1337.5	6	1397.5	54.5	5312.5	6710

manures, Nitrogen and Potash, on Spring Wheat.

Per cent. of crop, grain.	Per cent. of crop, straw.	Ratio of grain to straw.	Appearance of crop when standing.	Amount of rust.	Length of straw.	Strength of straw.	Condition of straw.	Remarks on Grain.	Number of plot.
18.2	81.8	1:4.5	61	80	70	80	.....	Badly shrunken	40
19.3	80.7	1:4.2	75	80	78	82	.....	Well filled	39
19.2	80.8	1:4.2	70	92	68	80	.....	Small; not filled	38
19.3	80.7	1:4.2	75	90	75	82	.....	Even sample but small	37
21.7	78.3	1:3.6	70	99	70	80	.....	Small and shrunken	36
18.7	81.3	1:4.3	65	98	70	80	.....	Uneven and shrunken	35
18.1	81.9	1:4.5	68	98	75	80	.....	Small and shrunken	31
16.7	83.3	1:4.9	58	90	60	80	.....	Small and shrunken	30
20.5	79.5	1:3.9	68	98	78	80	.....	Small and uneven	29
18.8	81.2	1:4.3	68	98	80	80	.....	Large but uneven	28
20.1	79.9	1:3.9	89	95	90	85	.....	Large and even..... . ..	27
19	81	1:4.2	90	98	90	80	....	Small, even sample	26
17.1	82.9	1:4.7	90	95	95	80	.....	Large but shrunken	25
19.2	80.8	1:4.2	95	98	92	80	.....	Even but small	24
19.6	80.4	1:4.0	87	98	90	80	.....	Even but small	23
19.2	80.8	1:4.7	87	98	90	80	.....	Even sample.....	22
20.8	79.2	1:3.8	90	98	95	80	.....	Large and well filled.....	21

2ND TWO ACRE SET.—Result of testing special manures,

Date of Ripening.	Market Grain, Bushels per acre.	Market Grain, Pounds per acre.	Small Grain, Pounds per one-tenth acre.	Total pounds per acre.	Weight per measured bushel.	Straw, pounds per acre.	Total weight of crop per acre.
Aug. 29.....	18.416	1055	5	1105	52.8	4085	5190
" 29.....	19.375	1067.5	9.5	1162.5	54.5	3787.5	4950
" 29.....	18.000	1005	7.5	1080	50	4010	5090
" 29..... ...	16.208	932.5	4	972.5	52.5	3697.5	4670
" 29.....	15.125	842.5	6.5	907.5	53.2	3422.5	4330
" 29.....	22.416	1305	4	1345	55	4785	6130
" 29.....	19.750	1135	5	1185	53.5	4345	5532
" 29.....	17.291	997.5	4	1037.5	52.5	4072.5	5110
" 29	20.583	1175	3	1235	56	3925	5160
" 29.....	21.883	1205	3	1265	54.3	4075	5340
" 29.....	17.666	1000	3	1060	54.9	3260	4320
" 29.....	17.458	992.5	5.5	1047.5	55.3	3522.5	4570
" 29.....	18.958	1087.5	5	1137.5	55.5	3502.5	4640
" 29.....	24.916	1415	4	1495	55.5	4405	5900
" 29..... ...	19.291	1097.5	6	1157.5	54.3	3492.5	4650
" 29.....	17.000	970	5	1020	51	3360	4380
" 29.....	15.291	877.5	4	917.5	49.5	3142.5	4060
" 29.....	17.125	892.5	13.5	1027.5	58	3182.5	4210
" 29....	16.666	910	9	1000	50.2	3170	4170
" 29.....	17.541	987.5	6.5	1052.5	52	3297.5	4350

Phosphoric Acid and Sulphate of Lime, on Spring Wheat, 1883.

Per cent. of crop, grain.	Per cent. of crop, straw.	Ratio of grain to straw.	Appearance of crop when standing.	Amount of rust.	Length of straw.	Strength of straw.	Condition of straw.	Remarks on Grain.	Number of plot.
21.3	78.7	1:3.7	95	79	90	79	.....	Large but shrunken.....	41
23.5	76.5	1:3.2	90	78	80	80	.....	Large but uneven	42
21.3	78.7	1:3.7	65	80	79	70	.....	" "	43
20.8	79.2	1:3.8	90	84	80	70	.....	Sample even	44
21	79	1:3.8	70	80	80	69	.....	Small and shrunken	45
21.9	78.1	1:3.5	95	85	90	70	.....	Sample even and well filled	46
21.4	78.6	1:3.6	93	87	90	70	.....	Small but well filled	47
20.3	79.7	1:3.9	90	85	95	70	.....	Large but shrunken.....	48
23.9	76.1	1:3.1	95	85	98	70	.....	Uneven sample.	49
23.6	76.4	1:3.2	100	85	99	70	.....	Sample large but shrunken	50
24.5	75.6	1:3.0	95	85	74	78	.....	Sample uneven.....	51
23	77	1:3.3	93	85	75	80	.....	Sample even but shrunken.....	52
24.6	75.4	1:3.0	95	85	79	80	.....	Large; well filled	53
25.4	74.6	1:2.9	98	85	82	78	.....	Sample even and well filled.....	54
24.9	75.1	1:3.0	95	85	76	80	.....	Very large and well filled	55
23.3	76.7	1:3.3	75	85	80	80	.....	Very large but shrunken	56
22.6	77.4	1:3.4	78	85	78	80	.....	Sample coarse; not filled	57
24.3	75.7	1:3.1	80	80	88	80	.....	Sample large but shrunken	58
24	76	1:3.1	80	80	88	80	... ..	Sample large but badly shrunken.	59
24.2	75.8	1:3.1	82	80	90	80	.....	Sample large but not filled	60

In briefly reviewing these results of the field experiments we shall examine—

First, the plots which received no manure;
Secondly, the plots which received farm-yard manure;
Thirdly, the plots which received one artificial fertilizer;
Fourthly, the plots which received two artificial fertilizers;
Fifthly, the plots which received all three artificial fertilizers.

1st. The plots which received no manure are—No. 30 of the 1st Two-acre Set and No. 45 of the 2nd Two-acre Set. Per acre, the bushels of market grain from plot 30 were, 8.2; the pounds of market grain, 442.5; the weight per measured bushel, 51; the total weight of crop, 2,950; the grain small and shrunken. Per acre, the bushels of market grain from plot 45 were, 15.1; the pounds of market grain, 842.5; the weight per measured bushel, 53.2; the total weight of crop, 4,330; the grain also small and shrunken.

The returns from one of these unmanured plots nearly doubles the returns from the other. The average of the two plots, expressed in bushels of wheat per acre, is 11.5.

2nd. The results obtained from the plots treated with farm-yard manure—plots 25 and 50—show also a great divergence. Per acre, the bushels of market grain from plot 25 were, 16.1; the pounds of market grain, 910; the weight per measured bushel, 53.2; the total weight of crop, 5,690; the grain large but shrunken. Per acre, the bushels of market grain from plot 50 were, 21.8; the pounds of market grain, 1,205; the weight per measured bushel, 54.3; the total weight of crop, 5,340; the grain large but shrunken.

It will be noticed that a difference of $5\frac{1}{2}$ bushels per acre occurs in plots that have been treated with the same quantity of farm-yard manure. The average of the two plots, expressed in bushels of wheat per acre, is 18.9.

3rd. The plots which received one artificial fertilizer are Nos. 40, 39, and 38, of 1st Two-acre Set; and Nos. 41, 42, and 43, of 2nd Two acre Set.

Per acre, the yield of plot 40—nitrate of soda, two-thirds ration—was, 9.2 bushels, only one bushel more than the return from no manure in the same range; the yield of plot 39—superphosphate, two-thirds ration—was, 10.9 bushels; and the yield of plot 38—muriate of potash, two-thirds ration—was, 11 bushels.

Turning to the plots of the 2nd Two-acre Set that were treated with one artificial fertilizer, we notice a marked difference in the results. Per acre, plot 41—nitrogen mixture, two-thirds ration—yielded nearly $18\frac{1}{2}$ bushels; plot 42—superphosphate, two-thirds ration—$19\frac{1}{4}$ bushels; and plot 43—muriate of potash, two-thirds ration—18 bushels. Is it not remarkable that the average of these three returns from two-thirds rations of simple fertilizers is equal to the average obtained from heavy dressings of farm-yard manure?

4th. The plots which received two artificial fertilizers are Nos. 37, 36, and 35, of 1st Two-acre Set; and Nos. 44, 46, and 47, of 2nd Two-acre Set.

The yield from the plots of the 1st Two-acre Set, with the exception of plot 36—two-thirds ration, nitrate of soda and muriate of potash—is scarcely up to the average of no manure; that from the plots of the 2nd Two-acre Set, with the exception of plot 44—two-thirds ration, nitrogen mixture and superphosphate—is greater than the average from farm-yard manure. Plot 46—two-thirds ration, superphosphate and muriate of potash—yielded per acre $22\frac{1}{2}$ bushels.

5th. The plots which received all three artificial fertilizers will be best considered in groups.

1. Nitrogen Group.

(*a*) Nitrate of Soda Set.

(*b*) Ammonium Sulphate Set.

(*c*) Organic Nitrogen—Dried Blood Set.

In these three sets of the Nitrogen Group there were used two-thirds rations of superphosphate of lime and muriate of potash, with one-third, two-thirds, and full rations of the nitrogen in each form.

(*a*) *Nitrate of Soda Set*—Plots 34, 33, and 32. They were so thrown back by wet that no account could be taken of them.

(*b*) *Ammonium Sulphate Set*—Plots 31, 29, and 28. Per acre, the yield of 31—one-third ration—was, 11 bushels; the yield of 29—two-thirds ration—was, 15 bushels; the yield of 28—full ration—was, 15¼ bushels. Though these crops gave considerable promise at one time, and were thought almost too rank and superior, through wet the return is much smaller than that obtained in three cases by the fertilizers used separately.

(*c*) *Dried Blood Set*—Plots 27, 26, and 24. Per acre, the yield from plot 27—one-third ration—and plot 26—two-thirds ration—was in each case nearly 17 bushels; that from plot 24—full ration—more than 17 bushels. These returns appear low, they are, however, higher than those obtained from farm-yard manure under like conditions. Plot 25, lying between the plots with dried blood, was treated with farm-yard manure, and yielded only 16 bushels per acre.

2. Muriate of Potash Group.

In the one set of this group, there were two-thirds rations of superphosphate of lime and nitrate of soda used with one-third, two-thirds, and full rations of muriate of potash. The plots are 23, 22, and 21. Per acre, the yield from plot 23—one third ration—was nearly 18 bushels; the yield from plot 22—two-thirds ration—was nearly 17 bushels; the yield from plot 21—full ration—was 23¼ bushels. In this set the return from two-thirds ration is smaller than that from one-third ration, indicating a difference in the physical condition of the two plots lying side by side.

3. Phosphoric Acid Group.

(*a*) Soluble Phosphoric Acid Set.

(*b*) Precipitated Phosphoric Acid Set.

(*c*) Insoluble Phosphoric Acid Set.

In these three sets of the phosphoric acid group, there were two-thirds rations of nitrogen mixture and muriate of potash used with one-third, two-thirds, and full rations of phosphoric acid in each form.

(*a*) *Soluble Phosphoric Acid Set*—Plots 48, 49 and 51. Per acre, the yield of Plot 48—one-third ration—was 17¼ bushels; the yield of Plot 49—two-thirds rations—was 20½ bushels; the yield of Plot 51—full rations—was 17½ bushels. More evidence of inequality in the physical conditions of the soil of the Plots become apparent. First, a greater yield is obtained from the two-thirds rations than from the full. Secondly, the nitrogen mixture and the muriate of patash, used without the superphosphate, gave 19¾ bushels per acre. This yield of the two fertilizers is higher than the average of all three fertilizers taken together.

(*b*) *Precipitated Phosphoric Acid Set*—Plots 52, 53, and 54. Per acre, the yield from Plot 52—one-third ration—was nearly 17½ bushels; the yield from Plot 53—two-thirds ration—was nearly 19 bushels; the yield from Plot 54—*full ration—was about 25 bushels—the highest return.*

(*c*) *Insoluble Phosphoric Acid Set*—Plots 55, 56, and 57. Per acre, the yield from Plot 55—one-third ration—was 19¼ bushels; the yield from Plot 56—two-thirds ration—was 17 bushels; the yield from Plot 57—full ration—was 15¼ bushels. In this Insoluble Phosphoric Acid Set, the greatest return is obtained from the *one-third ration*, the least from the full ration. One striking peculiarity characterizes the Phosphoric Acid group. However dark and healthy the crop looked in dry spots, during the wet season, in "low places," it had "a yellow colour."

4. *Sulphate of Lime Group*—Plots 58, 59, and 60. The average from the three plots of this group is 17 bushels per acre.

The results obtained from one and the same fertilizer when applied to different plots vary so much, no explanation can be given of them, if like physical conditions be assigned the soil of all the plots. Seven bushels market grain per acre, indicates the difference between the *no manure plots*, and, nearly six bushels, the difference between those treated with farm-yard manure. Simple fertilizers on one plot are without apparent action; their effect upon another plot more than equals that of the complete fertilizer. These facts force us to admit that the unusually wet Summer has made manifest *the unequal drainage of the field.* From the results of this year's manuring, on the *Co-operative Principle*, no judgment can be passed either upon the quantity or quality of the soil's plant food. In conclusion, we shall briefly indicate the appearance the plots presented during the early part of Summer.

The blades came up evenly on all the plots; when the roots began to draw nourishment from the soil, a difference in growth became at once apparent.

Of the Nitrogen Plots, those that evinced the most rapid growth were 27, 26, and 24—*the dried blood Set.* The rapidity of growth appeared to vary according to the amount of the manure applied. The growth of Plot 41 (nitrogen mixture) resembled greatly that of 26—two-thirds ration of dried blood.

The Ammonium Sulphate Plots—31, 29, and 28—stood second in rapidity of growth. It was interesting to notice how boldly the crops of these plots struggled against the cold and wet of May and June. Plot 30—no manure—lying between 31 and 29, though drier, had a very inferior crop.

The Nitrate of Soda Plots—34, 33, and 32, (also 40—Nitrate of Soda, two-thirds ration) could not be distinguished from Plot 30 to which no manure had been applied. Nitric acid, the great cereal fertilizer, must have been completely washed from the soil by rain. It will be applied next year as a top-dressing.

On Plot 41—nitrogen mixture—larger and fuller heads appeared than on the plots treated with dried blood; the tendency to rust was not so great though the situations were similar.

Muriate of potash gave apparently no results.

Superphosphate greatly aided growth, giving a healthy dark green colour to the blade.

Reverted *phosphoric acid* appeared perfectly inactive until the heads began to form. The highest return was obtained from this fertilizer.

Gypsum and bone dust were apparently of no value in producing growth of straw.

Plots classified, June 15th, according to the growth displayed by crops:

1. Plots 24 to 27, 41.
2. " 21 to 23, 28, 29, 50, 46, 42, and 48 to 51.
3. " 39, and 52 to 60.
4. " The balance.

4. *Soil Analysis.*

In discussing the system of cooperative experimenting with fertilizers in last year's Report, we said that "a most careful examination of the physical and chemical character of the soil should precede and accompany the experiments in order, if possible, exactly to formulate, the *effects* of the fertilizers and the *feeding capacities* of different plants." In acknowledging the assistance rendered by Professor Brown in making four cross-sections of the surface soil and the subsoil of the experimental field, we promised to publish in this year's Report, an analysis of the soil and of some of the experimental crops.

We have found, during 1883, that the Educational work we have in the College is quite equal to our strength; besides, it was not until the middle of August that quantitative work could be done in the laboratory.

We found, from the conversations we held with the Chemists of the Agricultural Stations we visited during the summer, that the analyses of soil were entirely discouraged. In the Report of 1882 of the Connecticut Agricultural Stations, the work that "a Chemist cannot do," is well stated:

"You know that it has been frequently a matter of experience that a hundred

pounds of Peruvian guano, of the old-fashioned sort that we had twenty years ago, would make the difference between a good crop and a poor crop, when it happened to be applied to the right land, with the right crop and right weather. That hundred pounds of Peruvian guano contained about fifteen per cent. of nitrogen, fifteen per cent. of phosphoric acid, and about three per cent. of potash, to which thirty-three pounds of ingredients its fertilizing value was alone due. The soil of an acre of land, taken to the depth of one foot, will weigh about four millions of pounds. Thirty-three pounds of fertilizer, and four millions of pounds of soil. Assuming that the crop got all its nutriment from the first foot of ground, are the two quantities which, put one above the other, the smallest at the top and a line between, make the fraction which the Chemist must figure down to if he will find out from an analysis of the soil what element of fertility that soil is deficient in, viz: $\frac{33}{4000000}$ or $\frac{1}{121000}$. But, in fact, if the Chemist in two analyses of the same sample of soil gets results which agree within $\frac{1}{100000}$ he is lucky, and his luck does more towards that result than his skill, for usually the tenth of one per cent., or $\frac{1}{1000}$ is about the limit accuracy in Chemical Analysis. *It may thus easily happen that the Chemists cannot by analysis distinguish between two soils, one of which has had a dressing of* $\frac{1}{100000}$ *lbs. of the best Peruvian guano to the acre, and the other nothing.*"

It was not until we had progressed some distance in the analysis of the soil, according to the generally followed method of Wolff, that the full meaning of the quotation we have just given became apparent. The weight that the *available* and *essential* constituents of a soil bears to the weight of the soil itself, is so small, that the agricultural chemist, by the most accurate analytical methods, cannot distinguish between two acres of land, one of which has received a dressing of $\frac{1}{10000}$ lbs. of the best Peruvian guano, and the other nothing; and yet, the first acre will yield a luxuriant crop, the second a comparatively poor one. Further, to ascertain the nutritive constituents of a soil, a number of *acid solvents, arbitrarily chosen*, and without any known relation to the solvent action excited by roots, are successively brought in contact with it, and the soil's *actual* and *possible* nutritive value determined from an analysis of the extractions.

The acid solvents used consecutively in extracting the available plant food from the soil are of different strength, beginning with distilled water and ending with boiling sulphuric or hydrofluoric acid. In the following list, the order and manner of their application are given:

1. Cold, distilled water, one-fourth saturated with carbonic acid.
2. Cold concentrated hydrochloric acid (*Sp. Gr. = 1·15*).
3. Boiling concentrated hydrochloric acid of the same strength.
4. Hot concentrated sulphuric acid.
5. Hydrofluoric acid.

Every one believes, other things being equal, that "*productiveness is, or should be, sensibly proportional to the amount of available plant food within reach of the roots during the period of the plant's development.*" Could solvents that would represent correctly the action of the plant itself on the soil ingredients, be found, we would be able readily to distinguish between the fruitful and the unfruitful soil, and to assign reasons for the distinction.

Knowing that Professor E. W. Hilgard, Professor of Agriculture, at the University of California, strongly favoured the making of soil analyses, we opened a correspondence with him, in which, he was particularly requested to send us his writings upon the subject. His writings upon soil analysis were soon in our possession.

Professor Hilgard accepts the universally admitted fact that the ultimate analysis of soils affords little or no clew to their agricultural value. "Such agents as fluohydric acid and alkaline carbonates go by far, deeper than the solvents, naturally acting in soils bearing vegetation, will go within the limits of time in which we are interested."

He thinks that the two chief factors that have contributed to bringing soil analysis into disrepute in Europe are, first, "the fact that virgin soils are there practically non-existent, nearly all the soils analyzed having been at some time subjected to cultivation, and concurrently, to the use of manures, thus veiling their original characteristics, and rendering extremely difficult, to say the least, the taking of any sample of soil that shall correctly represent the whole of a large field or district"; second, "the absence of sys-

tematic investigation of the subject, since the time of the introduction of the most essential improvements in the determination of some of the chiefly important mineral soil ingredients."

In his remarks upon the advantages and need of soil investigation in the United States, reference is made to the vast tracts of land (that the plough has never yet touched, and where manure, outside of the flower and vegetable garden, is an unknown quality), that are covered with their original vegetation, and to the intelligent settler, who, as a means of diagnosing the actual productiveness of the land he proposes to clear, examines the quality of the vegetation that grows upon it. The remark of Professor Johnson, that he "would rather trust an old farmer to tell him about the value of a soil, than the best chemist alive," is not very flattering to the chemist, especially, as "old farmers will frequently disagree," "If the old farmer can train his judgment in this matter so as to make shrewd guesses, the agricultural chemist ought to be able to do a great deal better; for he should know all that the farmer does, and a great deal more besides; and, in addition, he should bring to bear upon the whole subject a well-trained mind, accustomed to accurate observation and logical reasoning; unlike the old farmer who 'knows' that 'wheat turns into cheat' in unfavourable seasons."

Professor Hilgard is now endeavouring to approach the solution of the problem by taking for granted, that the old farmer's method of judging of a soil's productiveness from its natural condition, is a good one. By a close chemical and physical examination of soils in their natural condition, he is seeking to find out the causes that determine this natural selection on the part of certain species of trees and herbaceous plants. In the selection of the solvent for making the soil extract to be analyzed, he considers, that minerals not sensibly attacked by several days' hot digestion with strong hydrochloric acid, are not likely to furnish anything of importance to agriculture, within a generation or two. From investigations he has had Dr. R. H. Loughridge make upon a soil as fully "generalized" in its origin as can be obtained, he has found, that hydrochloric acid of about the specific gravity of 1.115 seems to exert the maximum effect, and, that the extraction is practically complete after a water-bath digestion of five days. In the analysis of this extraction the methods of Grandeau are particularly favoured by the Professor.

Professor Hilgard determines the "moisture co-efficient" of the "fine earth" by exposing a very thin layer of the same to a fully saturated atmosphere for at least twelve hours, at a sensibly constant temperature. His results differ somewhat from those obtained by Knop, Shübler, and others, owing, he thinks, to the more complete fulfilment in his experiments of the full conditions of full saturation of air as well as soil. He finds that the absorbtion-co-efficient is practically constant at temperatures between $+7^{\circ}$ and $+25^{\circ}$. He further finds that this co-efficient, contrary to conclusions reached by Adolph Mayer, exerts an important influence upon the actual productiveness of soils.

The main *points* he considers substantially proven by the comparison of soil analysis are the following:—

1. "Other things being equal, the thriftiness (*i.e.*, present productiveness), of a soil is measurably dependant upon the presence of a certain minimum percentage of lime." Almost all the trees, the Professor says, which the "old farmer" habitually selects as a guide to a good "location" are such as frequent *calcareous soils.* If the lime percentage will manifest itself unequivocally in the free-growth it "should not fall below 0·100 in the lightest sandy soils; in clay loams not below a fourth of one per cent. 0·250; and in heavy clay soils not below 0·500, and may advantageously rise to one and even two per cent. Beyond the latter figure it seems in no case to act more favourably than a less amount, unless it be mechanically."

The advantages resulting from the presence of an adequate supply of lime in soils, he specifies as follows:—

"(*a*) A more rapid transformation of vegetable matter into *active* humus, which manifests itself by a dark, or deep black tint of the soil.

"(*b*) The retention of such humus, against the oxidizing influence of hot climates;

witness the high humus percentages of such soils, as against all others in the Southern States.

"(*c*) Whether through the medium of this humus, or in a more direct manner, it renders adequate for profitable culture percentages of phosphoric acid and potash so small that in the case of deficiency or absence of lime, the soil is practically sterile.

"(*d*) It tends to secure the proper maintenance of the conditions of nitrification, whereby the inert nitrogen of the soil is rendered available.

"(*e*) It exerts a most important physical action on the flocculation, and therefore on the tillability of the soil, as heretofore shown by Schlæssing and by myself."

In the great majority of soils the lime percentage is greater in the sub-soil than in the surface soil, owing, he thinks, to the easy solubility of calcic carbonate in the soil water. "The efficacy of lime in preventing running to weed in fresh soils, and in favouring the production of fruit, is conspicuously shown in a number of cases. This controlling influence of lime renders its determination alone a matter of no small interest, since its deficiency can very generally be cheaply remedied, avoiding the use of more costly fertilizers."

Professor Hilgard has been unable to trace any connection of magnesia with any of the important qualities of soils, though its percentage is frequently double that of the lime.

"2. The *phosphoric acid* percentage is that which, in connection with that of lime, seems to govern most commonly the productiveness of our virgin soils. In any of these, less than five hundreds (0·05) must be regarded as a serious deficiency. In sandy loam soils, one-tenth (0·100), when accompanied by a fair supply of lime, secures a fair productiveness for eight to fifteen years; with a deficiency of lime, twice that percentage will only serve for a similar time. The maximum percentage thus far found in an upland soil by my method of analysis, is about a quarter of one per cent. (0·250), in the splendid tableland soils of West Tennessee and Mississippi. In the best bottom ('buckshot') soil of the Mississippi, three-tenths (0·30). In that of a black prairie of Texas, 0·46 per cent. This being the highest figure that has come under my observation."

How the lime compounds contained in the soil act in rendering the phosphates more available Prof. Hilyard is at present unable to explain.

"3. The potash percentages of soils seem in a large number of cases, to vary with that of 'clay'; that is, in clay soils they are usually high, in sandy soils low; and since sub-soils are in all ordinary cases more clayey than surface soils, their potash percentage is almost invariably higher also."

"The potash-percentage of heavy clay upland soil and clay loams ranges from about 0.8 to 0.5 per cent., lighter loams from 0.45 to 0.30, sandy loams below 0.3, and sandy soils of great depth may fall below 0.100 consistently with good productiveness and durability; the former depending upon the amounts of lime and phosphoric acid with which it is associated. Virgin soils falling below 0.060 in their potash-percentage seem, in all cases that have come under my observation, to be deficient in available potash, its application to such soils being followed by an immediate great increase of production."

Since but few soils fall below this minimum, it is the Professor's opinion that potash manures are not among the first to be sought for after the soils have become "tired" by exhaustive culture.

4. Soda, he finds, varies mostly from one-eighth to one-third of the percentage of potash; he can trace no connection between its percentage and any important property of the soil, any more than in the case of *magnesia* and *manganese*.

"5. *Sulphuric acid* is found in very small quantities only, even in highly fertile soils. From two to four hundredths of one per cent. (0.02 to 0.04), seems to be an adequate supply, but it frequently rises to one-tenth (0.1) per cent., rarely higher."

6. *Chlorine*, on account of its "constant variability and universal presence in waters," was left undetermined.

7. "Iron, in the shape of ferric hydrate finely diffused, appears to be an important soil ingredient on account of its physical, and partly also its chemical properties. The universal preference given to red lands, by farmers, is sufficiently indicative of the results of experience in this respect, and I have taken pains to investigate its causes. The high absorptive power of ferric hydrate for gases is probably first among the benefits it confers. Red soils resist drought better than similar soils lacking the ferric hydrate."

The following analysis of the soil of the Experimental Field was made according to the method of Professor Hilgard :—

Moisture	2.941
Organic and volatile matter	10.494
Sand, silica and insoluble silicates	78.590
Phosphoric acid	0.039
Sulphuric acid	0.150
Oxide of iron and alumina	6.297
Lime	0 925
Magnesia	0.420
Potash	0.086
Soda	0.056
	100.000

The "mechanical" and "Physico-chemical" analysis of the soil of the Experimental Field, nearly completed last August, we shall complete and publish in a subsequent Report.

We would respectfully suggest through you, Sir, to the Honourable the Minister of Agriculture, our great need of an assistant in the department of Chemistry. The educational work of this department demands the full time and energy of one chemist. If analytical work is done for the Province, or the farmers of the Province, a proportionate neglect of the educational work must result, or the health of the chemist in charge suffer. The Agricultural Experimental Stations of the United States owe their great popularity to the analytical work that is done in them. The farmers of the different States that sustain these stations have, as they desire, analyses of soils, manures, food, etc., *made free of cost.* We are constantly receiving letters from Ontario farmers, in which like favours are asked of us, and are humiliated by not being able to grant them.

Your obedient servant,

R. B. HARE,

Professor of Chemistry and Lecturer on Geology and Meteorology.

PART III.

REPORT

OF THE

PROFESSOR OF BIOLOGY.

ONTARIO AGRICULTURAL COLLEGE,

December 31st, 1883.

To the President of the Ontario Agricultural College:

SIR,—I have the honour of presenting to you the second annual report of what has been accomplished in the department of Biology and Theoretical Horticulture in the Ontario Agricultural College. The late Professor Agassiz has remarked that "Agriculture is Biology applied," a fact which must be clear to any one considering the relations of the two sciences. The science of Agriculture is the study of the most suitable conditions for the growth and increase of economic plants and animals; the science of Biology is the study of life, and its relations to surrounding circumstances. By Biology we are taught, for instance, the nature of a plant's food, the mode of absorption of that food, the character of the tissues, or fruit, of the plant, as the case may be. Agriculture taking cognizance of these facts discovered by Biology, applies them; employs a certain manure rich in the proper nutritive substances, cultivates the ground, prunes the useless branches, etc., in order that the proper conditions for healthy absorption may be present, and makes use of those parts of the plant which Biological investigation has shown to be of economic value.

And so it is with the Zoological division. Physiology (a branch of Biology) teaches how foods are digested, and what foods are most suitable for the formation of any structure. Agriculture applies this knowledge in fattening live stock, and in rendering more abundant and suitable any particular product. By judicious food and proper environments, we should be able, by feeding an excess of certain fodders, to produce an extra amount of flesh, an extra amount of milk, or an extra amount of wool, as the case may be. And this, to a certain extent, we can do; but in this, as in many departments, we have not yet reached perfection, simply because our knowledge of the proper fodder and proper conditions for its transformation into the required substances is not perfect. Another important aid the study of Biology affords to Agriculturists, is the knowledge of the life-histories, and conditions of existence of the ecto- and endo-parasites which annually destroy so much of the agricultural produce of any country. A knowledge of the life-history of these pests is, of course, necessary, before we can discuss the best and most economical means of destroying them, and this the study of Biology furnishes. Much has been done by scientific investigators in this field. Entomologists, Helminthologists, and Fungologists, have all rendered, and are still rendering, efficient services to agriculture. Many of the most destructive and virulent diseases have been

brought to nothing, or, at all events, greatly ameliorated, by the discovery by biologists of their œtiology. The researches of Pasteur *et alii* in France, have discovered to us a means of combating the deadly anthrax. Thomas, and independently at the same time, Leuckart, within the last year, have unveiled the mystery which has so long shrouded the "liver-rot" in sheep, and have given us data by which we can determine on prophylactic treatment.

These remarks have been called forth not so much by a desire to point out the value of the study of Biology, as to indicate certain lines in which the science may be applied with great advantage. This institution being an Experimental Farm, established not only with the object of giving intending agriculturists a scientific knowledge of their future profession, but also, as I take it, with the view of discovering facts in any department of study which may be of advantage to the farming community, ought to aid by all means in its power the carrying on of observations and experiments which have this end in view. Dr. Maxwell T. Masters, in a recently published work on *Life on the Farm*, remarks: "The special value to the cultivator of scientific knowledge will probably be found in the power it gives him of availing himself of new resources, and of adapting himself to altered conditions—no light matter in the present state of agriculture." It is the bounden duty of this College not only to give that scientific knowledge, but also to furnish the "new resources," whereby difficulties may be overcome, and advantages increased.

In certain departments it has been possible to fulfil both duties, but in the department I have the honour to represent, much has yet to be done before the "new resources" can be supplied in any adequate manner. During the past year I have endeavoured to carry on investigations in certain of the lines indicated above, but with only partial success. The science of Biology has now reached such a state of advancement that it is only with a thoroughly equipped laboratory, with proper instruments, and with ample literature, that one can expect to make satisfactory investigations. The Biological department of the Ontario Agricultural College has no specially appointed laboratory, no instruments, microscopes, etc., by which either instruction may be communicated to the students, or investigations carried on by the Professor, and the Biological literature, though certain valuable works have been added in the last two years, is very scant.

Perhaps, under these circumstances, I may be allowed to urge the immediate construction of the conservatories and attached laboratory, and the granting of permission to purchase two or three microscopes, at a moderate cost. The latter it is very necessary to have before I commence the lectures on Structural and Systematic Botany; since, if it were possible to show the students the actual stages, for instance, in the life-history of the "Rust" fungus, they would be enabled to retain the facts connected therewith much more perfectly than from merely hearing of them, reading about them, or seeing an imperfect representation of them by a diagram, and, in addition, greater interest could be awakened in the study of fungoid and other diseases, which would, perhaps, result in a more perfect knowledge of their origin, and of the means to be employed to eradicate and prevent them.

Lectures.

As regards the teaching work in the College, I have to report an increased attention manifested by the students, and an earnest desire to profit by the instruction offered them by the large majority. In the Biological lectures to the first year, I have to report a change in the programme. Hitherto it has been the custom to lecture on Zoology during both the fall and winter terms. This plan appeared to me unwise, for several reasons. In the first place, when it is considered that after the short course of instruction obtained in the first year, the immense majority of students pay no attention whatever to comparative morphology, and since, unless the subject is followed out, a course of lectures entering to any great extent into the details of the morphology of the less important forms, is of very little use, and consumes valuable time, which might be otherwise employed, it seemed that a course of lectures on Animal Physiology, dealing with the physiology of man and the domestic animals, and entering also into the subjects

of Sanitary Science and Hygiene, would be of considerable value to young men, whose intention it was to become farmers in various parts of the country.

The first term I therefore devoted to a course of lectures on Animal Physiology, Sanitary Science, and Hygiene, for a more detailed account of which the circular must be consulted, and I had the gratification of finding the course greatly appreciated by all who had an opportunity of listening to it. The second term I employed for Comparative Anatomy and Zoology, condensing many of the relatively unimportant portions of the subject, and laying more stress on the subjects more related to agriculture, and and the allied sciences. By this change I accomplished two very important objects; the course was made more useful, from a practical point of view, and it was also made much more interesting.

During the first and second terms I also pursued a course of critical reading of English Classics, taking first, Scott's "Marmion," Canto. VI, and after Christmas Goldsmith's "Traveller." The spring term was taken up with a course on Structural and Physiological Botany. To the second year, during the winter term, I delivered a course of lectures on Economic Entomology, drawing especial attention to the insects which had manifested their presence to a more than usual extent during the previous summer, and illustrating the lectures as far as possible with specimens from our entomological collection. It is much to be regretted that so short a time is devoted to the study of this most important subject. It is impossible to treat it as it ought to be treated in a short course of lectures, and a course virtually devoid of any practical instruction. If the course could be given during the summer months, it would be a great improvement, for then the various insect forms could be studied in the fields, and benefits much more lasting and important would be derived from the study. It is all very well to inform the students that such and such a form makes its appearance in the imago state in such and such a month, and the larva so many days later, and that such and such remedies should be applied for the destruction of the imago, and others to the larva. He may by a systematic "cram" drive these facts into his head, only to forget them immediately examinations are over. Could he follow these stages during the summer months, and apply, or see applied, the remedies, and note their success, the fact would be indelibly impressed upon his mind, and in the future should he be obliged to use his knowledge to determine the nature of the pest, and the remedies to be applied, he would not be at a loss.

During the spring term I also delivered lectures to the second year on Systematic and Economic Botany, and Theoretical Horticulture. The former of these subjects I endeavoured, and with considerable success, to make practical. On several occasions we spent a couple of hours in the woods, examining the various plants, both cryptogamous and phanerogamous, then to be found, identifying typical examples, and so learning practically the general characters of important groups, and, in addition to this, by giving to each student one or two examples of a plant previously collected, and requiring a detailed account of its structure, and an identification of it, to be handed into me at the next lecture, I made the course as practical as was possible under the circumstances.

The economic portion of the course unfortunately could not be dealt with in a similar manner. Owing to the want of space in, and the imperfection of our present conservatories, it has been impossible to cultivate examples of many plants of great economic importance, and I have been obliged to content myself with a mere verbal description of them, except in cases of indigenous forms, when, as a rule, a dried specimen could be shown. The Horticultural lectures were of the same nature as last year, an exposition of the physiological grounds for various operations, and the conditions best suited for successful fruit growing, descriptions of the various operations, etc., being to a large extent neglected since the students receive instructions in these points from our very efficient Superintendent of the Horticultural Department.

SPECIAL WORK.

(A) Black Knot.

In last year's report I took occasion to present an account of the life-history of the fungus of Black Knot as far as known. As a result, I have received several letters from different parts of the country upon various points in connection with the subject, and having had my attention drawn to one or two facts not enumerated in last year's report, it may be well to mention them here.

The Black Knot this year has affected to a very large extent the Cherry trees throughout the country, in many districts to an alarming extent. Knots have been sent to me from different localities for examination; all presented the same characters. They were similar in all general features to the knots of the plum which I had previously examined, but this difference was to be noticed:—The knot in every instance was found to be traversed by a channel varying somewhat in size, some knots containing two or three. In these channels were to be found small larvæ about half an inch long, flesh-coloured, with brown, rather hard, heads, footless, but provided with locomotive bristles. (See plate fig. 8.) These I recognized to be larvæ of the plum weevil, *Conotrachelus nenuphar*, (Herbst).

Here is a fact then of no little importance, and yet, strange to say, in more recent Entomological works no notice whatever is taken of it, although the fact of insects inhabiting these warts has been known for a very considerable length of time.. In July, 1818, Professor W. D. Peck obtained from warty excrescences of the cherry tree the same insect he "had long known to occasion the fall of peaches, apricots, and plums, before they had acquired half their growth;" and, not aware that this species had received a scientific name, he called it *Rynchænus Cerasi*, the cherry weevil. On studying this larva Professor Peck found that, leaving the wart after a time, it descended to the ground, where it pupated, and twenty-four days after, the adult insect appeared. This is a description of the very form under consideration, it having previously been named *Curculio nenuphar* by Herbst, and later *Conotrachelus* by Dejean. Harris in his "Insects Injurious to Vegetation," thus speaks of the inhabitants of the knot: "Insects are often found in the warts of the plum-tree, as well as those of the cherry-tree. The larvæ of a minute Cynips, or gall-fly, are said to inhabit them, but have never fallen under my observation. The naked caterpillars of a minute moth are very common in the warts of the plum-tree, in which also are sometimes found other insects, among them little grubs, from which genuine plum-weevils have been raised. This is a very interesting fact in the economy of the plum-weevil. It may be questioned, however, whether it be a mere mistake of instinct that leads the curculio to lay its eggs in the warts of the plum tree, or a special provision of a wise Providence to secure thereby a succession of the species in fruitful seasons."

It has been supposed by some that the insect was the cause of the wart, but even old writers, such as Harris, Burnett, and others, to whom the real fungoid character of the disease was not a certainty, unite in considering the larva of *Conotrachelus nenuphar*, merely a temporary occupant of the knot, and not its cause. There can be no doubt now that such is really the case. The fact of the knot frequently occurring without any contained weevils, the general characters of the Sphæriaceous group of fungi, and the special investigations that have been carried on in the Black Knot, all prove its fungoid nature.

This being the case, are we to consider the presence of the larvæ in the interior of the wart as the result of a "mere mistake of instinct," or a manifestation of a high degree of instinct, or perhaps reason? The latter hypothesis seems the more probable. The parent weevils have discovered that the larvæ will thrive probably as well in the knot as in the plum, and in default of the latter, have made use of this knowledge. In the previous report I showed that the growth of the wart was due to an increased growth of the bast cells of the plum or cherry, i.e., of the cells through which the sap ascends or descends the tree. This explains how the larvæ can exist in such a

spot. Well can they do so, for they are in a situation to obtain a large quantity, and an oft renewed supply, of light nutritive food.

The great prevalence of this peculiarity renders, to a certain extent, the remedies usually adopted for the plum-weevil of none effect. These remedies are (1), jarring the tree whilst the beetles are flying and ovopositing in the young plums, so that they will drop into a receptacle placed at the foot of the tree; (2) collecting and destroying all half formed plums which have fallen to the ground. Now, it is evident that if the larvæ can thrive in the knots on the cherry trees, and the beetles will ovoposit there, our remedies, being applied altogether to the plum-trees, will be useless. This is a further reason for the extermination of the Black Knot. Not only does it enfeeble and render unfruitful the trees which it has attacked, but it may also be a harbour for other pests, quite troublesome enough under ordinary circumstances. It behooves all fruit growers whose trees are in the slightest degree affected with Black Knot to *cut it out and burn it*; by not doing so they render themselves culpable, injuring not only themselves, but their neighbours.

Horticulturists throughout the country do not appear to recognize the importance of the remedial measures. I have seen young trees literally almost covered with knot, and forming most unsightly objects, capable of inoculating the trees over the whole country. The law for the protection of plum and cherry trees (Statutes of Ontario, 42 Vic., Chap. 33) is almost a dead-letter. Little or no importance seems to be paid to it. This is owing to the fact that it is nobody's duty to enforce it. The third section of the act permits the appointment by any Municipal Corporation, of an officer or inspector for the enforcement of the law, "and if no such officer or inspector be appointed, it shall be the duty of the overseer of highways, upon request of any person interested, to give the notice mentioned in section one." The municipal corporations do not seem to have considered it advisable or worth while to appoint an inspector, and interested parties, probably partly from a dislike to call down the majesty of the law upon their neighbours, and partly from ignorance of the great importance of the complete eradication of the pest, have not requested the inspector of highways to interfere, and since this functionary is only authorized by law to take action in the matter when requested to do so, affairs have been allowed to go on as they please, the knot has spread more and more every year, and has now become a most important and serious trouble. The remedy for this—it is important that a remedy should be applied—is either to compel the municipalities to appoint inspectors to see the law enforced, or else to make it the duty of the inspector of highways to compel horticulturists to extirpate the disease. For this purpose powers similar to those bestowed upon that official for the destruction of Canada thistles should be granted. This latter plan would probably answer more or less satisfactorily, but the former would be still more effective. In fact, it would be of very great benefit to the country were the Government, following the example of the state of California, to pass an act for the protection of crops of all kinds from pests, whether insect or fungoid, appointing inspectors for each county or district, whose sole duty it would be to see that proper remedies were put in force for the destruction of any pest, acting on the authority and advice of a board composed of individuals capable of recognizing the importance of the evil, and of recommending efficient remedies. In this way, and this only, we might expect immunity, not only from black knot, Canada thistles, "yellows" of peaches, which are now supposed to be dealt with by Act of Parliament, but likewise in the course of time from such pests as the "Hessian fly," the midge, phylloxera, and many others, which will immediately suggest themselves.

New pests also, which make their appearance from time to time, might thus be combated. Here I may call attention to a weed which has within the last few years made its appearance here, and now threatens to become somewhat of a pest, as it is already in certain parts of the States. The plant I allude to is variously known as "Devil's weed," "Viper's Bugloss," "Blue weed," (*Echium vulgare, L*). Imported to this continent orginally from Europe, and into Canada either directly from Europe or from the States, it has rapidly become naturalized and has spread with almost amazing rapidity. Introduced here within the last six or seven years, it now forms a common feature of our road-side flora, and is spreading rapidly over uncultivated land, and even making its

appearance in cultivated fields near the road-sides, vying with the Canada Thistle with considerable success. The plant is a foot and a half or two feet high, with elongated bunches of flowers at the extremities of the branches, the flowers being of a deep purplish blue color, shading off in places into violet or purplish red. The seeds are produced in very large numbers, the plant flowering during the greater part of the summer, one flower being succeeded by another in rapid succession. It is a well known fact that when animals and plants imported into a new country become naturalized, they rapidly increase, and in many instances become exceedingly annoying, finding the conditions for existence in the new country even more favourable than in the old. So it was with the rabbits imported into Australia, so it is with the sparrows in this and other countries. In Virginia this "Blue weed" has invaded cultivated fields and is quite as great a nuisance as our thistles, and from the manner in which the plant is spreading in this locality, there is a great probability of its proving as great an annoyance, unless means are adopted for its destruction.

(B) The Tape-worm Epizootic.

Interesting and important as the study of parasites is at all times, it becomes doubly so when one is brought face to face with their destructive powers. Of these the past spring gave us indubitable examples. Our lambs were attacked in large numbers by a species of tape-worm, which in many cases was so numerous in the intestines as to cause death. Into the diagnosis, pathology and medicinal treatment it is not my province to enter. These subjects will no doubt be treated of by the Professor of Veterinary Science in his report. The origin of the disease and the cause of its spread belongs, however, to the department of Biology, since these are points which can only be understood when one is acquainted with the mode of life exhibited by the tape-worms. Before going into these subjects it will be necessary, in order that they may be understood, to give an account of the structure of this form, and of the life-history of another, in which this is known, for, unfortunately, we do not as yet know the changes undergone by the worm under consideration, but can only imagine their general feature from analogy with what occurs in all forms in which they are known. And first of all as to the structure.

The worm which thus affected the lambs is known to science as *Tænia expansa, Rud.* The mature worm measures sometimes as much as fifteen feet, but the average is very much less than this, being perhaps about a foot, some individuals measuring not more than two inches, and measuring in breadth from the thickness of a pin at the head (Fig. 4, a) to a quarter of an inch or more, according to the length (Fig. 4, d). It is flat and thin, and presents, especially towards the posterior region, a segmented appearance, due to the fact that the worm is really segmented into a series of joints, each of which correspond to a distinct animal formed by budding from the original head, just as the various individuals of a "sea-fir" or "sea-mat" bud off from a parent form, and so produce a colony. These are all the points to be noted in a naked-eye examination, and it is necessary to resort to the miscroscope for further particulars as to the organization. Taking the anterior region then, (Fig. 6) we find that there is a well-marked dilated portion forming the extremity and corresponding to the head of the worm, and on this are to be seen four circular depressions, (Fig. 6, s) two on one side and two on the other, surrounded with muscular tissue. These are the suckers by which the worm retains its hold upon the intestine of its host. Many forms, in addition, possess an anterior projection furnished with several hook-like spicules, which aid in fixing the parasite. These, however, are absent in *Tænia expansa* and some other forms, which are therefore said to belong to the "unarmed" group.

Passing posteriorly we come to the upper portion of the body, which cannot be described in this form, as in many others, as being separated from the head by a distinct neck. At the anterior portion of this no traces of segmentation can be seen, but a clear line can be seen running down each side—the water-vascular tubes, (Fig. 6, v) as they are termed, probably excretory in their functions. A little further back the budding commences, (Fig. 4, b) indicated by a transverse striation, the segments not being separated off. Still further back, (Fig. 4, c) however, they become formed, and the first traces

of the generative organs make their appearance, but do not become fully mature until we reach the segments near the posterior extremity. Here (Fig. 4, d, and 5) by a careful examination we can see that each segment is furnished with two pairs of reproductive organs, a male and female organ on either side, and that corresponding with each pair there is a genital pore on either side, (Fig. 7, g a) consisting of a hollow with a thickened wall, at the bottom of which the reproductive organs open, and which is capable of being extended out so as to form a protrusion upon the side of the segment. This is an important feature, since in the majority of *Tæniæ* each segment contains only a single pair of organs, a male and a female, and possesses only a single generative pore, found now on one side of the segment, now on the other. The mature segments in *Tænia expansa* are rectangular, always broader than long, measuring from six to twenty-four two-hundred and fiftieths of an inch ($\frac{6}{250}$-$\frac{24}{250}$),—the latter size being rarely found even in very old and long examples—in breadth, and from one to three two-hundred and fiftieths of an inch in length ($\frac{1}{250}$-$\frac{3}{250}$). These mature posterior segments will also be seen to contain many eggs scattered irregularly throughout the segment, round in shape, and measuring from $\frac{1}{625}$ to $\frac{1}{500}$ of an inch.

It will perhaps be as well to insert here a few remarks of a more technical nature upon the structure and measurements of the *T. expansa*. The segments appear to vary somewhat in thickness. In the example pourtrayed in Fig. 4, in which the posterior segments were not quite mature, they measured on an average about 1.84 mm., the breadth being about 3 mm. In the form represented by Fig. 5, however, in which the posterior segments were mature, they were very much broader in comparison to the length (by the length I mean the antero-posterior measurement). They measured 9.2 mm. in length, and 6 mm. in breadth, so that not only is the relative proportion between the length and breadth different, but the actual breadth is only one half. Another point in regard to the segments was very noticeable. In several instances what may be termed a malformation of the segments occur, of which examples are shown in Fig. 4 c and in Fig. 5. This consists in the development of the segment only on one side, it tapering away and being undeveloped on the other.

Two sets of generative organs exist in each segment. The complete morphology of these organs I have not yet had opportunity to study; but from what I have been able to observe the following points may be stated: The genital opening (one on either side of each segment, with the occasional exceptions mentioned above) is surrounded by a comparatively thick muscular ring, measuring .192–.24 mm. From this a deep "cirrus-beutel" passes inwards, in which lies the cirrus (Fig. 7 p) slightly protruding from the opening. At the base of the "cirrusbeutel" the vagina opens. The vas deferens (vd) passes almost directly inwards to the testis (t), a granular clump which stains very deeply. The vagina is directed at first downwards, and then passes upwards to the neighbourhood of the testis. The uterus seems somewhat discrete; the ova lying scattered somewhat irregularly throughout the segment, measure about 52 mm.

So much then for the structure; now for a few facts in regard to the physiology of the *Tænia*. Fastened to the wall of the intestine, and streaming back along it, the tape-worm lies surrounded with nutritive fluid. The tissues of the body being soft, nutrition can penetrate them, and no stomach or intestine is required, and accordingly no trace of them is found in tape-worms. The nervous system is of a comparatively low grade of organization, as is usual in parasites. When the ova in the posterior segment become properly ripe, that segment drops off, is passed to the exterior with the fæces, and lies upon the ground. In the course of time, by the decay of the tissues of the segment, the eggs (Fig. 7 Ov.) are set free. They being enclosed in a hard shell will not suffer from the putrefactive changes going on around them, and if supplied with a sufficient amount of moisture and warmth will develope. The segment which now forms the posterior extremity of the worm, in its turn becomes ripe and drops off, new ones being formed over the anterior extremity of the body, behind the head, so that there is a constant succession of segments as long as the head remains alive. This accounts for the difficulty usually experienced in getting rid of tape-worms, since unless the head can be got away or destroyed, budding will go on as usual, and the trouble remains as bad as before treatment.

The *Tænia expansa* occurs usually in the intestine of our domestic sheep and goats, less frequently in cattle. Especially often is it present in numbers in lambs, then causing the so-called tape-worm plague (Bandwurmseuche).

For a description of the plan of developement of the tape-worms, we are obliged to leave *Tænia expansa*, since its life-history is not yet known. The general plan of development, which characterizes more or less closely all forms yet examined, is as follows.

The egg, developing under the influence of a certain amount of heat and *moisture*, hatches out as a minute ciliated embryo. This swims about in the water for a while, a very small quantity of water being sufficient for this purpose, and in the interior a second skin developes, unciliated, provided with six hooks. The ciliated larva having gained entrance into the intestine of some animal (as a rule a different animal than the adult worm inhabits, the tape-worm of man, for instance, occurring first in the pig), the ciliated covering is thrown off, and the six-hooked unciliated embryo (Fig. 2) bores through the intestinal walls and becomes encysted in some part of the body—the liver, muscles, connective tissue, lungs, or even the brain. Here the solid embryo becomes hollow or filled with fluid, and the hooks disappear, what is known as the "cystic" or "bladder-worm" resulting from these changes. The next change is the development of the head of the future tape-worm. This is formed by an involution on the inner surface of the cystic worm, on which the suckers and hooks, if they be present, eventually arise, but are at this time situated on the inner surface of the involution, the future head being just now in reality turned outside in. The larva, when these changes have been consummated, is known as the *Cysticercus* (Fig. 1). In many forms the ciliated stage is passed over, the worm leaving the egg as the six-hooked embryo; in this case the embryo is swallowed by the intermediate host unwittingly and developes into the cystic stage. Moisture, however, is still necessary for the development of the egg. This mode probably obtains in *T. expansa.*

Development now comes to a standstill until the animal infected by the cysticercus is eaten by some other form, *i. e.*, by the one in which the mature worm is found, usually a vertebrate. Then the cyst around the cysticercus becomes dissolved, and the cysticercus set free, whereupon it immediately causes the head to turn inside out, and fasten to the wall of the intestine. We have now the commencement of the adult worm; the head fully formed, succeeded by a larger or smaller sac (Fig. 3). This stage is known as the *Scolex*. Segmentation now commences, and we very soon obtain the sexually mature form, by which the eggs were formed.

It will be seen from these facts that certain requisites are necessary before the embryo can come to maturity. (1) The eggs must be supplied with moisture; (2) the six-hooked larva must become encysted in the body of some intermediate form; (3) this intermediate form must be devoured by the animal in which the mature worm occurs. The second of the above conditions has some apparent exceptions, but they are very few. Mègnin ("Comptes Rendus," XCVI, 1883) has given an instance in which examples of *T. serrata* in the intestine of a dog must have been derived by direct reproduction from ova set free by larger forms.

It will now be readily perceived that the discovery of the intermediate host would be very important, for once it is known, prophylactic treatment might be easily adopted. However, going further back, the moisture is evidently an important factor in causing the spread of tape-worms; for without it the ova will not develope. The great amount of wet weather we experienced last spring, and the pasturing of the sheep during it, was probably one of the great causes of the origin of the epizootic. Although not widely spread over the country, by inquiry I learned of two or three other instances of it, and in all, the sheep had been on the pasture during the wet weather; and further, in both of the cases where I had an opportunity to make an examination of the pasture, I found that in some parts of it there were depressions filled with water, the ground for some distance around being soft. Dr. Zürn, extraordinary professor of Veterinary Science in the University of Leipsic, in his work on animal parasites, makes a somewhat similar statement. He says:—"The affection indeed occurs in sheep which have fed idly in stalls, but more usually in the younger or youngest animals of a flock which has been put out to pasture. There is no doubt that the first stages of the parasite are usually received by the sheep

upon the pasture. A wet year; wet, moist, boggy, meadow pastures, wet sandy soils, are favourable to the development of the tape-worm. When the disease occurs in sucking-lambs, it must either be received during the time which they are still within the mother—the tape-worm coming from the mother, or received with the mother's milk, as has been supposed. When, however, young tender lambs on the pasture take a draught of water here and there (and the eggs of *T. expansa* appear only to be able to develope in water and damp earth), then in that case a direct infection is possible."

The intermediate host. On the first intimation of the presence of the trouble I made a careful search on the pastures over which the sheep had been running for any forms which might be likely to contain the encysted stage, and which were sufficiently numerous to excite suspicion. The only forms I found in any numbers, in any of the fields, was the ordinary slug. This, had the question been of a Trematode or the final host a bird, would have awakened suspicion, but not so when a Cestode and a mammal were concerned, nevertheless I gathered many, made a careful dissection of them, but my search was fruitless. I may state here that the facilities I possess for work of this kind are exceedingly small, having, as has been already mentioned, no laboratory, and little literature from which to obtain assistance, and these facts have militated very strongly against, and in fact prevented any prosecution of, the suggestions to be presentd hereafter on this subject.

The pastures being, to all intents and purposes, destitute of any forms that were to be suspected, my attentions were directed elsewhere. After various false starts, I at length struck upon what I now consider to be the desired animal, but unfortunately was unable to verify my idea by direct proof, my opinion being based mainly on *a priori* reasons. The form which I believe to contain the encysted stage of *T. expansa* is the sheep tick (*Melophagus ovinus*,) Linn.

My reasons for believing the Tick to be the offending form are as follows:—

1. As we learn from the extract above quoted from Zürn, the tape-worm occurs in sucking lambs. The theories he there puts forward to explain this fact are improbable, to say the least. It is quite possible, and even probable, that the lambs, in sucking, may swallow some of the ticks, since it is well known that balls of wool are frequently found in their stomachs, which wool has been pulled from the mother. Ticks might readily be taken in along with this wool, or even sucked off a teat in the ordinary course of events. I see no other way in which sucking lambs can obtain the worm.

2. After a careful examination of the pastures at the farm, and at other localities in which the disease had broken out, I could find no animal uniformly present, or in sufficient numbers to justify its being considered the intermediate host, with the exception of the Ticks. These were present, in both instances in large numbers.

3. The life history of *T. cucumerina*, Bloch, has been discovered. This form which inhabits the intestine of the dog, belongs structurally to to the same group as *T. expansa* and there are good grounds for supposing that associated with the similarities of structure are similarities of development. According to Leuckart and Melnikoff the cysticercoid stage of *T. cucumerina* occurs in the dog-louse (*Trichodectes canis*, DeGeer.) The cysticercoids of the meal-worm are probably also the young stage of certain worms occurring in mice and rats. The supposition as to the host of the cysticercoid of *T. expansa* is quite in analogy with these facts.

It is not difficult to imagine how the embryo could make its way into the ticks. The sheep congregate together in certain parts of the pasture, and there the ova of the tape-worm will be deposited by older infected sheep along with the excrement. In the wet weather they would develope, the six-hooked embryos hatch, and would readily get among the sheep's wool when it was lying down, and so be liable to be swallowed by a tick.

Prophylactic treatment. Whether this theory proves correct or not on further research, the fact remains that the ticks are dangerous, and no harm and possibly much good will result from their destruction when a flock is known to be in danger of infection. In addition to this the sheep should be kept housed in wet weather, and the dung

collected and burnt as soon after it is cast as possible. By these plans, the eggs will be prevented from developing, and if medical treatment be bestowed upon the older infected sheep the disease will soon be eradicated.

Interesting experiments have been made by Schwalenberg on the efficiency of various medicines in expelling the tape-worm from sheep, and perhaps I may be pardoned for exceeding my limits to give a short account of them. He tried the effect of the following substances:—Persian insect powder, Petroleum, Chabert's oil, Kamala, Kousso, and Koussin. The three last named, proved most successful.

I. Experiment. A drachm of Kamala was given to each lamb. On the following morning the animals were very sick and had no appetite; the body temperature was lowered, the skin pale, and the body thin; after forty-eight hours, profuse diarrhœa occurred, and tape-worms were passed, the lambs recovered very slowly, and remained thin for a long time, in spite of good care. This remedy seems to act on the tape-worms quite satisfactorily, but its constitutional effects preclude its use under ordinary circumstances.

II. Experiment. Two drachms (7½ grains) Kousso, per lamb, showed good result. Koussin (also called Tæniin or Brayerin, a rosin from the flowers of *Brayera anthelmintica*, which is crystalline and colourless, with acid reaction, and acts very powerfully on parasites,) acted still more successfully; 2 grains or 12 centigrs. were given to each lamb in decoction of wormwood, the tape-worms were almost instantly expelled, the animals under treatment remained well, with good appetite, and continued well subsequently.

As to the original source of the worms, it is probable that more or fewer of the older sheep are always infected, and that in ordinary weather the spread of the infection does not proceed rapidly, nor are sufficient worms developed to render the infection noticeable. In exceptional weather such as we experienced last spring, in which a constant succession of rainy days prevailed for some time, the conditions are particularly favourable for the development of the ova, and for the metamorphoses, so that large numbers of lambs become infected and that too, severely: under these circumstances the epizootic becomes evident. The tape-worm disease then may be said to be *endemic*, and under certain circumstances may become *epidemic*.

Explanation of Plate.

Fig. 1. Encysted or Cysticercus stage of *Tænia*. *a*, head. *b*, envelope. *c*, remains of the six embryonic hooks (From Gegenbaur after von Siebold.)

Fig. 2. Six-hooked embryo (after Huxley.)

Fig. 3. Same *Tænia* as fig. 1 in which the head has been protruded. Lettering as in fig. 1. (from Gegenbaur after von Siebold,)

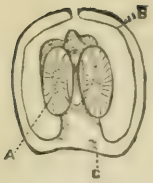
Fig. 4. Portions of a *Tænia expansa* not quite mature, natural size. *a*, head. *b*, commencement of segmentation. *c*, first distinct appearance of genital organs. *d*, terminal portion.

Fig. 5. Posterior segments of mature *Tænia expansa*, mature natural size.

Fig. 6. Head of *Tænia expansa* highly magnified *s*, sucker. *v*, excretory vessels.

Fig. 7. Portion of segment from same form as fig. 5, highly magnified. *t*, testis. *v. d.*, vas deference. *v*, longitudinal excretory vessel. *p*, cirrus. *ga*, genital pore, *ov.*, ova. *va.*, vagina.

Fig. 8. Larva of *Conotrachelus nenuphar* the plum curculio, (slightly modified from figure in Packard's Guide.)



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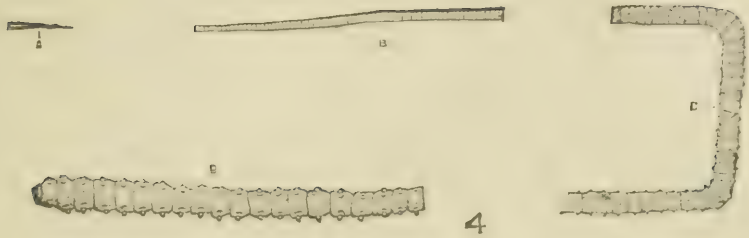

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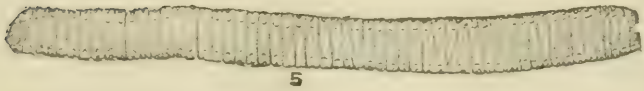

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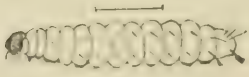

8

(c) The Japanese Herbarium.

The collection of Japanese plants which has been added to the Botanical section of our Museum since the publication of the report for 1882, merits a somewhat detailed notice, as illustrating the similarities, as far as the larger groups are concerned, which exist between the floras of countries so widely separated as Canada and Japan.

To the scientific Botanists of Canada, a list of the genera and species in the collection may not come amiss, and to Horticulturists, and others, such a list will indicate how much we are indebted to Japan for choice exotics.

The collection was made, and the genera and species were identified by a Japanese Botanist, and, although the most difficult portion of the work of classifying and arranging was thus already accomplished, still no little labour remained in arranging the various genera in their proper sequence, and referring them to their proper orders, since many are unfamiliar to a Canadian Botanist, and the literature on the flora of Japan not easily attainable. I must here record my thanks to Mr. H. B. Spotton, M.A., F.L.S., for the valuable assistance he afforded me in this work, his extensive knowledge of Botany coming to my aid in cases in which, for want of works of reference, I was unable to proceed.

The general classification I have followed is that of Prof. A. de Jussieu, as given in Le Maout and Decaisne's valuable work, edited and amended by Sir J. D. Hooker. The principal points in which I have deviated from this arrangement are in the elevating the sub-classes Angiospermæ and Gymnospermæ to the dignity of classes, and similarly degrading the classes Dicotyledones and Monocotyledones. The reasons for this change are well known to all Botanists familiar with the modern researches on the development and the homologies of the reproductive processes in the various groups of the Vegetable Kingdom. For simplicity, I have omitted to give tribes, sub-orders, etc., and similarly have arranged the genera of each order, and the species of each genus alphabetically.

PHANEROGAMIA.

I. Sub-kingdom.—*Class I*, Angiospermæ.—*Sub-class I*, Dicotyledones.—*Division I*, Polypetala.—*Series I*, Thalamifloræ.

Cohort I.—Ranales.

I. Order—*Ranunculaceæ*.

Aconitum—
(1) Fischeri (Reich).

Anemone—
(2) cernua (Thb.).
(3) flaccida (Schm.).
(4) Japonica (S. et Z.).
(5) Nikoensis (Max.).

Aquilegia—
(6) glandulosa (Fisch.).

Clematis—
(7) paniculata (Thb.).
(8) patens (Morr. et Decne.).
(9) stans (S. et Z.).

Coptis—
(10) brachypetala (S. et Z.) *var.* major (Miq.).

Pæonia—
(11) albiflora (Pall.).

Ranunculus—
(12) acris (L.).
(13) sceleratus (L.).
(14) ternatus (Thb.).
(15) zuccarinii (Miq.).

Thalictrum—
(16) minus (L.).

II. Order—*Calycantheæ*.

Chimonanthus—
(17) fragrans (Lindl.).

III. Order—*Magnoliaceæ*.

Illicium—
(18) anisatum (L.).

Magnolia—
(19) compressa (Max.).
(20) conspicua (Salisb.).
(21) hypoleuca (S. et Z.).
(22) kobus (D. C.).
(23) obovata (Thb.).
(24) stellata (Max.).

IV. Order—*Menispermeæ*.

Cocculus—
(25) Thunbergii (D. C.).

V. Order—*Berberidaceæ*.

Aceranthus—
(26) sagittatus (S. et Z.).

Berberis—
(27) Chinensis (Desf.).
(28) Japonica (Roxb.).
(29) vulgaris (L.).

Epimedium—
(30) macranthum (Morr. et Decne).

Nandina—
(31) domestica (Thb.).

VI. Order—*Lardizabaleæ.*

Akebia—
(32) quinata (Decais.).

Stauntonia—
(33) hexaphylla (Decne.).

VII. Order—*Nymphæineæ.*

Brasenia—
(34) peltatum (Pursh.).

Nuphar—
(35) Japonicum (D. C.).

COHORT II.—PARIETALES.

VIII. Order—*Papaveraceæ.*

Chelidonium—
(3 majus (Mill.).

Macleya—
(37) cordata (R. Br.).

Stylophorum—
(38) Japonicum (Miq.).

IX. Order—*Fumariaceæ.*

Corydalis—
(39) decumbens (Pers.).
(40) incisa (Pers.).
(41) Wilfordi (Regel.), *var.* japonica (Fr.) et Sav.).

Dicentra—
(42) spectabilis (Miq.).

X. Order—*Cruciferæ.*

Arabis—
(43) saggittata (D. C.).

Capsella—
(44) bursa-pastoris (Mœnch.).

Cardamine—
(45) sylvatica (Leb.).

Draba—
(46) nemoralis (L.)

Entrema—
(47) Wasabi (Max.).

Nasturtium—
(48) montanum (Wall.).
(49) palustre (D. C.).

Thlaspi—
(50) arvense (L.).

XI. Order—*Violarieæ.*

Viola—
(51) grypocerus (Gray).
(52) Japonica (Langs.).
(53) longepedunculata? (Torr. et Sav.).
(54) Patrinii (D. C.).
(55) verecunda (Gray).

COHORT III.—POLYGALALES.

XII. Order—*Pittosporeæ.*

Pittosporum—
(56) Tobira (Ait.).

XIII. Order—*Polygaleæ.*

Polygala—
(57) Japonica (Houtt.).

COHORT IV.—CARYOPHYLLALES.

XIV. Order—*Caryophylleæ.*

Arenaria—
(58) leptodados (Guess.).

Cerastium—
(59) vulgatum (L.), *var.* glandulosum (Koch).

Dianthus—
(60) superbus (L.).

Lychnis—
(61) grandiflora (Jacq.).

Mollugo—
(62) stricta (L.), *var.* latifolia.

Saponaria—
(63) vaccaria (L.).

Silene—
(64) gallica (L.), *var.* quinquevulnera (L.).

Stellaria—
(65) media (Vill.).
(66) neglecta (Weihe).
(67) nemorum (L.) *var.* Japonica (Fr. et Sav.).
(68) uliginosa (Mum.).

COHORT V.—GUTTIFERALES.

XV. Order—*Hypericineæ.*

Hypericum—
(69) ascyron (L.).
(70) erectum (Thb.).
(71) patulum (Thb.).
(72) salicifolium (S. et Z.).

XVI. Order.—*Camelliaceæ.*

Actinidia—
(73) volubilis (Planch).

Camellia—
(74) japonica (L.).

Eurya—
(75) japonica (Thb.).

Stuartia—
(76) monadelpha (S. et Z.).

Ternstrœmia—
(77) japonica (Thb.).

COHORT VI.—MALVALES.

XVII. Order—*Tiliaceæ.*

Corchoropsis—
(78) crenata (S. and Z.).

Tilia—
(79) mandshurica.

SERIES II.—DISCIFLORÆ.

COHORT VII.—GERANIALES.

XVIII. Order—*Oxalideæ.*

Oxalis—
(80) corniculata (L.).

XIX. Order—*Coriarieæ.*

Coriaria.
(81) Japonica (Gray).

XX. Order—*Zygophylleæ.*

Tribulus—
(82) terrestris (L.).

XXI. Order—*Balsamineæ.*

Impatiens—
(83) Texteri (Miq.).

XXII. Order—*Zanthoxyleæ.*

Evodia—
(84) glauca (Miq.).
(85) rutæcarpa (Benth. and Hook.)

Picrasma—
(86) ailanthoides (Planch.).

Zanthoxylon—
(87) piperitum (D.C.).
(88) schinnifolium (S. et Z.).

COHORT VIII.—OLACALES.

XXIII. Order—*Ilicineæ.*

Ilex—
(89) crenata (Thb.).
(90) integra (Thb.).
(91) pedunculosa (Miq.).
(92) Sieboldi (Miq.).

COHORT IX.—CELASTRALES.

XXIV. Order—*Celastrineæ.*

Celastrus—
(93) articulatus (Thb.).
Euonymus—
(94) Japonicus (Thb.).
(95) radicans (Sieb.).
(96) Sieboldianus (Bl.).

XXV. Order—*Staphylaceæ.*

Euscaphus—
(97) staphyleoides (S. et Z.).

Staphylea—
(98) bumalda (S. et Z.).

XXVI. Order—*Rhamneæ.*

Berchemia—
(99) racemosa (S. et Z.).

Hovenia—
(100) dulcis (Thb.).

Zizyphus—
101 vulgaris (Lam.).

XXVII. Order—*Ampelidæ.*

Vitis—
(102) heterophylla (Thb.).
(103) Labrusca (L.).
(104) pentaphylla (Thb.)

COHORT X.—SAPINDALES.

XXVIII. Order.—*Sapindaceæ.*

Sapindus—
(105) Mukurosi (Gaertn.)

XXIX Order—*Acerineæ.*

Acer—
(106) cissifolium. (S. et Z.).
(107) Japonicum (Thb.).
(108) palmatum (Thb.).
(109) trifidum (Thb.).

XXX. Order—*Terebinthaceæ.*

Rhus—
(110) succedanea (L.).
(111) vernicifera (D.C.).

SERIES III.—CALYCIFLORÆ.

COHORT XI.—ROSALES.

XXXI Order—*Leguminosæ.*

Albizzia—
(112) Julibrissin (Boiv.).

Amphicarpæa—
(113) Edgeworthii (Benth.), *var.* Japonica (Ol.).

Astragalus—
(114) lotoides (Lam.).

Atylosia—
(115) subrhombea (Miq.).

Cæsalpinia—
(116) Japonica (S. et Z.).

Caragana—
(117) Chamlagri (Diet.).

Cercis—
(118) Chinensis (Bunge).

Cladrastis—
(119) amurensis (Benth), *var.* floribunda (Max.).

Desmodium—
(120) Japonicum (Miq.).

Gleditschia—
(121) Japonica (Miq.).

Glycine—
(122) Soja (S. et Z.).

Indigofera—
(123) decora (Lindl.).
(124) tinctoria (L.).

Lathyrus—
(125) Davidii (Hance.).
(126) maritimus (Biq.).
(127) palustris (L) *var.* linearifolius (Ser.).

Lespedeza—
(128) Juncea (Pers.).
(129) pilosa (S. et Z.)

Lotus.
(130) corniculatus (L.).

Medicago—
(131) denticulata (Willd.).
(132) Lupulina (L.).

Rhynchosia—
(133) volubilis (Lour)

Sophora—
(134) angustifolia (S. et Z.).
(135) Japonica (L.).

Thermopsis—
(136) fabacea (D. C.).

Trifolium—
(137) lupinaster (L.).
(138) repens (L.).

Vicia—
(139) angustifolia (Roth.).
(140) cracca (L.). *var.* Japonica (Miq.).
(141) hirsuta (Koch.).
(142) tetrasperma (Mœnch.).
(143) unijuga (Al. Braun).

Wistaria—
(144) Chinensis (S. et Z.).

XXXII. Order—*Rosaceæ.*

Agrimonia—
(145) viscidula (Bunge.), *var.* Japonica (Miq.).

Amelanchier—
(146) Canadensis (Torr. et Gray), *var.* Japonica (Miq.).

Cratægus—
(147) cuneata (S et Z.).
(148) sanguinea (Pall.).

Fragaria—
(149) indica (Andr.).

Geum—
(150) Japonicum (Thb.).

Kerria—
(151) Japonica (D. C.).

Photinia—
(152) glabra (Thb.).
(153) Japonica (Thb.).
(154) villosa (D. C.).

Potentilla—
(155) fragarioides (L.).
(156) fragarioides (L.), *var.* ternata (Max.).
(157) fruticosa (L.).
(158) Wallichiana (Del.).

Prunus—
(159) Buergeriana (Miq.).
(160) Japonica (Thb.).
(161) Mume (S. et Z.).
(162) Ssiori (Fr. Schm.).

Pyrus—
(163) Chinensis (Poir.).
(164) Cydonia (L.).
(165) Japonica (Thb.).

Pyrus—
(166) Japonica (Thb.), *var.* genuina (Max.).
(167) spectabilis (Ait.).
(168) Toringo (Sieb.).

Raphiolepis—
(169) Japonica (S. et Z.).

Rhodotypos—
(170) kerrioides (S. et Z.).

Rosa—
(171) luciæ (Torr. et Sav.), *var.* poteriifolia.
(172) microphylla (Rub.).
(173) multiflora (Thb.).
(174) rugosa (Thb.).

Rubus—
(175) cratægifolius (Bunge.). (?)
(176) palmatus (Thb.).
(177) parvifolius (L.).
(178) Thunbergii (S. et Z.).

Spiræ—
(179) callosa (Thb.).
(180) Japonica (L.).
(181) palmata (Thb.).
(182) prunifolia (S. et Z.).
(183) sorbifolia (L.).
(184) Thunbergii (Sieb.).

Stephanandra—
(185) flexuosa (S. et Z.).

XXXIII. Order—*Saxifrageæ.*

Astilbe—
(186) Chinensis (Max.).
(187) Chinensis (Max.), *var.* Japonica (Max.).
(188) Japonica (Miq.).
(189) Thunbergii (Miq.).

Chrysoplenium—
(190) alternifolium (L.).
(191) Grayanum (Max.), *var.* nipponica (Fr. et Sav.).

Hydrangea—
(192) hortensis (Sm.), *var.*
(193) hortensis (Sm.), *var*, acuminata (Gray).
(194) paniculata (Sieb.).
(195) Thunbergii (Sieb.).
(196) virens (Sieb.).

Saxifraga—
(197) tellimoides (Max.).

XXXIV. Order—*Philadelpheæ.*

Deutzia—
(198) gracilis (S. et Z.).
(199) scabra (Thb.).

XXXV. Order—*Crassulaceæ.*

Penthorum—
(200) Sedoides (L.).

Sedum—
(201) Kamtschaticum (Fisch. et Mey.).
(202) lineare (Thb.).
(203) subtile (Miq.).

XXXVI. Order—*Ribesiaceæ.*

Ribes—
(204) fasciculatum (S. et Z.).

XXXVII. Order—*Hamamelidæ.*

Corylopsis—
(205) spicata (S. et Z.).
(206) pauciflora (S. et Z.).

Distylium—
(207) racemosum (S. et Z.).

XXXVIII. Order—*Haloragieæ.*

Haloragis—
(208) micrantha (R. Br.).

COHORT XII.—MYRTALES.

XXXIX. Order—*Lythrarieæ.*

Lythrum—
(209) virgatum (L.).

XL. Order—*Onagrarieæ.*

Epilobium—
(210) spicatum (Lam.).

Jussiæa—
(211) repens (L.).

Ludwigia—
(212) prostrata (Roxb.).

COHORT XIII.—PASSIFLORALES.

XLI. Order—*Cucurbitaceæ.*

Actinostemma—
(213) Japonicum (Miq.).

COHORT XIV.—FICOIDALES.

XLII. Order—*Tetragonieæ.*

Tetragonia—
(214) expansa (Ait.).

COHORT XV.—UMBELLALES.

XLIII. Order—*Umbelliferæ.*

Angelica—
(215) decursiva (Miq.).
(216) Kinsiana (Max.).

Bupleurum—
(217) sachalinense (Fr. Schm.).

Caucalis—
(218) Japonica (Houtt).

Chamæle—
(219) tenera (Miq.).

Cryptotænia—
(220) Canadensis (D.C.).

Heracleum—
(221) barbatum (Led.).

Hydrocotyle—
(222) sibthorpioides (Lamk.).

Nothosmyrnium—
(223) Japonicum (Miq.)

Œnanthe—
(224) stoloniferum (D. C.).

Osmorrhiza—
(225) Japonica (S. et Z.)

Phelopterus—
(226) littoralis (Fr. Schm.).

Sanicula—
(227) elata (Hamilton).

Seseli—
(228) Libanostis (Koch).

Siler—
(229) divaricatum (Benth & Hook).

XLIV. Order—*Araliaceæ.*

Acanthopanax—
(230) spinosum (Miq.).

Fatsia—
(231) Japonica (Decne & Planch).

Helwingia—
(232) Japonica (Dietr.).

XLV. Order—*Corneæ.*

Aucuba—
(233) Japonica (Thb.).

Cornus—
(234) brachypoda (C. A. Mey).
(235) officinalis (S. et Z.).

Marlea—
(236) plantanifolia (S. et Z.).

DIVISION II.—MONOPETALA.

SERIES I.—EPIGYNÆ.

COHORT XVI.—CAPRIFOLIALES.

XLVI. Order—*Caprifoliaceæ.*

Abelia—
(237) serrata (S. et Z.).

Diervilla—
(238) grandiflora (S. et Z.).
(239) versicolor (S. et Z.).

Lonicera—
(240) gracilipes (Mig.)
(241) Japonica (Thb.).
(242) Morrowii (Gray).

Sambucus—
(243) racemosa (L.).
(244) Thunbergiana (Bl.).

Viburnum—
(245) dilatatum (Th.).
(246) odoratissimum (Ker.).
(247) opulus (L.)
(248) phlebotrichum (S. et Z).
(249) plicatum (Thb.).
(250) Sieboldi (Miq.).
(251) Wrightii.

XLVII. Order—*Rubiaceæ.*

Galium—
(252) aparine (L.).
(253) pogonanthum (Fr. et Sav).

Galium—
(254) trifidum (L.).
(255) verum (L.).

Gardenia—
(256) florida (L.).

Musænda—
(257) parviflora (Miq.).

Oldenlandia—
(258) brachypoda (D. C.).
(259) Japonica (Miq.).

Pæderia—
(260) fœtida (L.).

Serissa—
(261) fœtida (Com).

COHORT XVII.—ASTERALES.

XLVIII. Order—*Valerianæ*.

Patrinia—
(262) scabiosæfolia (Link).

Valeriana—
(263) flaccidissima (Max).
(264) officinalis (L.) *var.* angustifolia (Max.).

XLIX. Order—*Compositæ*.

Achillæa—
(265) sibirica (Lea).

Adenocaulon—
(266) adhærescens (Max.).

Artemisia—
(267) gilrescens (Miq.).

Aster—
(268) Cantoniensis (Bl.).
(269) Glehni (Fr. Schm.).
(270) hispidus (Thb.).
(271) indicus (L.).
(272) scaber (Thb.).
(273) spathulifolius (Max.).
(274) trinervus (Roxb.) *var.* ovata (Fr. et Sav.).

Atractylis—
(275) ovata (Thb.).

Bidens—
(276) pilosa (L.).
(277) tripartita (L.).

Carduus—
(278) crispus (L.) *var.* congesta (Fr. et Sav.).

Carpesium—
(279) abrotanoides (L.).

Cnicus—
(280) Japonicus (Max.).
(281) pendulus (Max.).
(282) spicatus (Max.).

Crepis—
(283) Japonica (Benth).
(284) Keiskeana (Max.).

Eclipta—
(285) alba (Hesk.).

Erigeron—
(286) Thunbergii (Gray).

Eupatorium—
(287) Japonicum (Th.).

Gerbera—
(288) anandria (Schult).

Gnaphalium—
(289) Japonicum (Thb.).
(290) margaritaceum (L.).
(291) multiceps (Wall.).

Gynura—
(292) pinnatida (D. C.).

Inula—
(293) Japonica (Thb.).

Ixeris—
(294) debilis (Gray).
(295) ramossima (Gray).
(296) Thunbergii (Gray).
(297) versicolor (D. C.)

Lampsana—
(298) apogonoides (Max.).
(299) parviflora (Gray).

Leucanthemum—
(300) nipponicum (Fr. et Sav.).

Macroclinidium—
(301) robustum (Max.).

Miriogyne—
(302) minuta (Less.).

Pertya—
(303) scandens (Thb.).

Petasites—
(304) Japonicus (Miq.).

Platycrater—
(305) arguta (S. et Z.),

Pyrethum—
(306) Decaisneanum (Max.).
(307) indicum (Cass.).
(308) sinense (Sav.) *var.* Japonicum (Max.).

Saussurea—
(309) Bungei (Hk. et Am.).

Senecio—
(310) campestris (D. C.).
(311) flammeus (D. C.)
(312) Japonicus (Schultz).
(313) Kœmpferi (D. C.).
(314) Krameri (Fr. et Sav.).
(315) stenocephalus (Max.) *var.* cornosa (Fr. et Sav.)
(316) Zuccarinii (Max.).

Serratula—
(317) coronata (L.).

Siegesbeckia—
(318) orientalis (L.).

Solidago—
(319) virga-aurea (L.).

Sonchus—
(320) oleraceus (L.).

Taraxcum—
(321) officinale (Wigg.) *var.* corniculatum (Koch.)

Xanthium—
(322) strumarium (L.).

COHORT XVIII.—CAMPANALES.

L. Order—*Campanulaceæ.*

Adenophora—
(323) trachelioides (Max.).
(324) verticillata (Fisch.).

Campanula—
(325) punctata (Lam.).

Phyteuma—
(326 Japonicum (Miq.).

Platycodon—
(327) grandiflorum (D. C.).

SERIES II.—HYPOGYNÆ ET PERIGYNÆ.

COHORT XIX.—ERICALES.

LI. Order—*Ericineæ.*

Andromeda—
(328) Japonica (Thb.).

Clethra—
(329) barbinervis (S. et Z).

Eukianthus—
(330) Japonicus (Hk.).

Rhododendron—
(331) Indicum (Sw.) *var.* obtusum (Max.).
(332) ledifolium (Dm.).
(333) ledifolium (Dm.) *var.* leucanthemum (D. C.).
(334) Metternichii (S. et Z).

LII. Order—*Monotropeæ.*

Monotropa—
(335) uniflora (L.).

LIII. Order—*Pyrolaceæ.*

Pyrola—
(336) rotundifolia (L.).

COHORT XX.—PRIMULALES.

LIV. Order—*Primulaceæ.*

Lysimachia—
(337) clethroides (Dubq.).
(338) davurica (Wild).
(339) fortunei (Max.).
(340) Japonica (Thb.).

Primula—
(341) cortusoides (L.).
(342) farinosa (L.) *var.* luteo-farinosa (Reg.) *forma* Japonica (Fr. et Sav.).

LV. Order—*Myrsineæ.*

Ardisia—
(343) crispula (D. C.).
(344) Japonica (D. C.).

Edgeworthia—
(345) papyrifera (S. et. Z.).

Orixa—
(346) Japonica (Thb.).

COHORT XXI.—EBENALES.

LVI. Order—*Ebenaceæ.*

Diospyros—
(347) Kaki (L.).

LVII. Order—*Styracaceæ.*

Styrax—
(348) Japonicum (S. et Z.).
(349) obassia (S. et Z.)

COHORT XXII.—GENTIANALES.

LVIII. Order—*Oleineæ.*

Forsythia—
(350) suspensa (Vahl.).

Ligustrum—
(351) Ibota (Sieb.).
(352) Japonicum (Thb.).
(353) reticulatum (Bl.).

Olea—
(354) aquifolium (S. et Z.).

LIX. Order—*Apocyneæ.*

Amsonia—
(355) elliptica (Rœm. et Schult).

Trachelospermum—
(356) jasminoides (Benth et Hook).

LX. Order—*Asclepiadeæ.*

Pycnostelma—
(357) Japonicum (Bunge).

Vincetoxicum—
(358) atratum (Morr et Decne.)
(359) Brandtii (Fr. et Sav.).
(360) Japonicum (Morr. et Decne).
(361) sublanceolatum (Max.)

LXI. Order—*Loganiaceæ.*

Buddleya—
(362) curviflora (Hk. et Am.).
Mitrasacme—
(363) Indica (R. Br.).

LXII. Order—*Gentianeæ.*

Gentiana—
(364) Buergeri (Miq.).
(365) squarrosa (Ledep.).
(366) Thunbergii (Griseb.).

Limnanthemum—
(367) nymphoides (Link.).

COHORT XXIII.—POLEMONIALES.

LXIII. Order—*Convolvulaceæ.*

Calystegia—
(368) Japonica (Miq.).
(369) soldanella (R. Br.).

LXIV. Order—*Borragineæ.*

Bothriospermum—
(370) tenellum (Miq.).

Eritrichium—
(371) Giulielmi (Gray).
(372) pedunculare (D. C.).

Lithospermum—
(373) Zollingeri (D. C.).

Omphalodes—
(374) Krameri (Fr. et Sav.).

COHORT XXIV.—SOLANALES.

LXV. Order—*Solaneæ*.

Chamæsaracha—
(375) Japonica (Fr. et Sav.).

Lycium—
(376) Chinense (Mill).

Scopolia—
(377) Japonica (Max.).

Solanum—
(378) Dulcamara (L.) *var.* ovatum (Dan.).
(379) lyratum (Thb.).
(380) nigrum (L.).

COHORT XXV.—PERSONALES.

LXVI. Order—*Scrophularineæ*.

Chelonopsis—
(381) moschuta (Miq.).

Mazus—
(382) rugosus (Lour.).

Monochasma—
(383) Sheareri (Max.).

Paulownia—
(384) imperialis (S. et Z.).

Scrophularia—
(385) alata (Gray).
(386) oldhami (Oliv.).

Vandelia—
(387) erecta (Benth).

Veronica—
(388) agrestis (L.).
(389) Anagallis (L.).
(390) longifolia (L.) *var.* subsessilis (Miq.).
(391) Thunbergii (Gray).
(392) Virginica (L.).

LXVII. Order—*Gesneraceæ*.

Rehmannia—
(393) lutea (Max.).

Conandron—
(393)* ramondioides (S. et Z.).

LXVIII. Order—*Bignoniaceæ*.

Catalpa—
(394) Kæmpferi (S. et Z.).

Tecoma—
(395) grandiflora (Delaun.).

LXIX. Order—*Acanthaceæ*.

Dicliptera—
(396) Buergeriana (Miq.).

Rostellularia—
(397) procumbens (Mes.).

COHORT XXVI.—LAMIALES.

LXX. Order—*Verbenaceæ*.

Callicarpa—
(398) Japonica (Th.).

Clerodendron—
(399) divaricatum (S. et Z.).
(400) trichostomum (Thb.).

Phrymna—
(401) leptostachys (L.).

Verbena—
(402) officinalis (L.).

Vitex—
(403) cannabifolia (S. et Z.).

LXXI. Order—*Labiatæ*.

Ajuga—
(404) decumbens (Th.) *var.* typica.
(405) ciliata (Bunge).

Brunella—
(406) vulgaris (L.).

Calamintha—
(407) Chinensis (Benth).
(408) gracilis (Benth).

Dracocephalum—
(409) Ryschianum (L.).
(410) urticæfolium (Miq.).

Dysophylla—
(411) Japonica (Miq.).

Elscholtzia—
(412) barbinervia (Miq.).
(413) cristata (Wild).
(414) sublanceolata (Miq.).

Lamium—
(415) album (L.).
(416) amplexicaule (L.).

Leonurus—
(417) sibiricus L.).

Mentha—
(418) arvensis (L.) *var.* vulgaris (Benth).

Mosla—
(418)* punctata (Max.) *var.*

Nepeta—
(419) Glechoma (Benth).
(420) Japonica (Max.).

Salvia—
(421) Japonica (Thb.).

Scutellaria—
(422) Indica (L.) *var.* Japonica.
(423) macrantha (Fisch.).
(424) Tanakæ (Fr. et Sav.)

Stachys—
(425) Baicalensis (Fisch.).

Thymus—
(426) serpyllum (L.) *var.*

LXXII. Order—*Plantaginaceæ.*

Plantago—
(427) Asiatica (L.).

DIVISION III.—APETALA.

Cohort XXVII.—Chenopodiales.

LXXIII. Order—*Phytolaccaceæ.*

Phytolacca—
(428) acinosa (Roxb.).

LXXIV. Order—*Polygoneæ.*

Polygonum—
(429) aviculare (L.).
(430) bistorta (L.),
(431) Blumei (Meisn.).
(432) Chinense (L.) *var.* Thunbergianum (Meisn.).
(433) cuspidatum (S. et Z.).
(434) filiforme (Thb.)
(435) multiflorum (Thb.).
(436) nodosum (Pers.).
(437) perfoliatum (L.).
(438) Thunbergii (S. et Z.) *var.* Mackianum.
(439) Thunbergii (S. et Z.) *var.* typica.

Rumex—
(440) acetosa (L.).
(441) Japonicus (Meisn.).

Cohort XXVIII.—Laurales.

LXXV. Order—*Laurineæ.*

Cinnamomum—
(442) camphora (Nies.).
(443) Loureiri (Nies.).

Daphnidium—
(444) strychnifolium.

Lindera—
(445) obtusiloba (Bl.)
(446) præcox (Bl.).

Cohort XXIX.—Daphnales.

LXXVI. Order—*Thymeleæ.*

Daphne—
(447) odora (Thb.).
(448) pseudomezereum (Gray).

LXXVII. Order—*Elæagneæ.*

Elæagnus—
(449) longipes (Gray).
(450) umbellata (Th.).

Cohort XXX.—Urticales.

LXXVIII. Order—*Urticeæ.*

Aphananthe—
(451) aspera (Planch).

Bœhmeria—
(452) biloba (Wedd.).
(453) longispica (Sten.) *var.* tricuspis (Hana.).
(454) nivea (Bl.).

Urtica—
(455) Thunbergiana (S. et Z.).

LXXIX. Order—*Moreæ.*

Broussonetia—
(456) papyrifera (Vent.)

Fatona—
(457) pilosa (Gand.).

Ficus—
(458) pyrifolia (Burm.).

LXXX. Order—*Celtideæ.*

Celtis—
(459) sinensis (Pers.).

LXXXI. Order—*Cannabineæ.*

Humulus—
(460) Japonica (S. et D.)

LXXXII. Order—*Ulmaceæ.*

Ulmus—
(461) parvifolia (Jacq.).

Zelkowa—
462) Keaki (Sieb.).

Cohort XXXI.—Amentales.

LXXIII. Order—*Betulaceæ.*

Alnus—
(463) incana (Wild) *var.* glauca (Ait.).
(464) maritima (Nutt.) *var.* Japonica (Regel.).

LXXXIV. Order—*Myriceæ.*

Myrica—
(465) rubra (S. et Z.).

LXXXV. Order—*Salicineæ.*

Salix—
(466) brachystachys (Benth.).
(467) multinervis (Fr. et Sav.).
(468) padifolia (Anders.).
(469) purpurea (L.).

Cohort XXXII.—Euphorbiales.

LXXXVI. Order—*Euphorbiaceæ.*

Elæococca—
(470) cordata (Bl.).

Euphorbia—
(471) helioscopia (L.).
(472) humifusa (Wild).
(473) lasiocaula (Bois.).
(474) Rochebruni (Fr. et Sav.).
(475) Sieboldiana (Morr. et Decne.).

Excœcaria—
(476) Japonica (J. Müll).

Mercurialis—
(477) liocarpus (S. et Z.)

Rottlera—
(478) Japonica (S. et Z.).

Securinega—
(479) Japonica (Miq.).

COHORT XXXIII.—PIPERALES.

LXXXVII. Order—*Saurureæ.*

Houttuynia—
(480) cordata (Thb.).

Saururus—
(481) Loureiri (D.C.)

LXXXVIII. Order—*Chloranthaceæ.*

Chloranthus—
(482) inconspicuus (Sw.)
(483) Japonicus (Sieb.).
(484) serratus (Rœm et Seb.)

COHORT XXXV.—ASARALES.

LXXXIX. Order—*Aristolochieæ.*

Aristolochia—
(485) debilis (S. et Z.).

Asarum—
(486) caulescens (Max.).

COHORT XXXVI.—QUERNALES.

XC. Order—*Juglandeæ.*

Juglans—
(487) Sieboldiana (Max.).

XCI. Order—*Cupuliferæ.*

Castanea—
(488) vulgaris (Lam.) *var.* Japonica (D.C.).

Quercus—
(489) acuta (Thb.).
(490) cuspidata (Thb.).
(491) dentata (Thb.).
(492) glabra (Thb.).
(493) glauca (Thb.) *forma* glabra.
(494) glauca (Thb.) *forma* sericea.
(495) phyllireoides (Gray).

XCII. Order—*Corylaceæ.*

Carpinus—
(496) Japonica (Bl.)
(497) laxiflora (Bl.).

COHORT XXXVII.—SANTALALES.

XCIII. Order—*Loranthaceæ.*

Viscum—
(498) album (L.).

XCIV. Order—*Santalaceæ.*

Thesium—
(499) decurrens (Bl.).

SUB-CLASS II.—MONOCOTYLEDONES.

DIVISION I.—OVARY INFERIOR.

COHORT III.—ORCHIDALES.

I. Order—*Orchideæ.*

Bletia—
(500) hyacintha (R. Br.).

Calanthe—
(501) discolor (Lindl.).

Cephalanthera—
(502) erecta (Lindl.).
(503) falcata (Lindl.).

Cymbidium—
(504) virens (Lindl.).

Cypripedium—
(505) cardiophyllum (Fr. et Sav.).

Gymnadenia—
(506) lancifolia (Fr. et Sav.).

Spiranthes—
(507) Australis (Lindl.).

COHORT V.—NARCISSALES.

II. Order—*Irideæ.*

Iris—
(508) sp? (Kakitsubata).
(509) lævigata (Fisch).
(510) sibirica (L.).

Pardanthus—
(511) Chinensis (Ker.).

III. Order—*Amaryllideæ.*

Narcissus—
(512) Tazzetta (F.). *var.* Chinensis (Rœm.).

COHORT VI.—DIOSCORALES.

IV. Order—*Dioscoreæ.*

Dioscorea—
(513) quinque-loba (Thb.).
(514) sativa (L.).

DIVISION II.—OVARY SUPERIOR.

COHORT VIII.—POTAMALES.

V. Order—*Potameæ (Jussieu).*

Potamogeton—
(515) crispus (L.).
(516) polygonifolius (Pouw.).

Ruppia—
(517) maritima (L.).

VI. Order—*Naiadeæ.*

Najas—
(518) major (All.).

COHORT X.—ARALES.

VII. Order—*Typhaceæ.*

Sparganium—
(519) longifolium (Turez).

Typha—
(520) Japonica (Miq.).

VIII. Order—*Aroideæ*

Acorus—
(521) graminensis (Ait.).

Arisæma—
(522) Japonicum (Bl.).
(523) ringens (Schott).
(524) Thunbergii (Bl.).

Pinellia—
(525) tuberifera (Ten.).

IX. Order—*Lemnaceæ.*

Spirodela—
(526) polyrrhiza (Schleid.).

COHORT XI.—LILIALES.

X. Order—*Ophiopogoneæ.*

Ophiopogon—
(527) Japonicus (Gawl.).
(528) spicatus (Gawl.).

XI. Order—*Liliaceæ.*

Allium—
(529) nipponicum (Fr. et Sav.).

Barnardia—
(530) Japonica (Rœm. et Schult.).

Erythronium—
(531) dens-canis (L.).

Fritillaria—
(532) Thunbergii (Miq.).

Funkia—
(533) Sieboldiana (Spreng.).

Hemerocallis—
(534) fulva (L.).
(535) minor (Mill.).

Lilium—
(536) auratum (Lindl.).
(537) coridion (Sieb.) *var.* parthenion (Sieb.).
(538) longiflorum (Thb.).
(539) Maximowiczii (Regel.).
(540) Thunbergianum (Rœm. et Sch.).

Orithya—
(541) edulis (Miq.).

XII. Order—*Melanthaceæ.*

Disporum—
(542) pullum (Salisb.).
(543) sessile (Don).
(544) smilacinum (A. Gray).

XIII. Order—*Smilaceæ.*

Paris—
(545) quadrifolia (L.). *var.* obovata (Regel).

Polygonatum—
(546) canaliculatum (Pursh).
(547) vulgare (Desf.)

Smilacina—
(548) bifolia (Desf.).
(549) Japonica (A. Gray).

Smilax—
(550) China (L.).
(551) herbacea (L.) *var.* nipponica (Max.).
(552) Sieboldi (Miq.).

Stemone—
(553) Japonica (Miq.).
(554) sessilifolia (Miq.).

XIV. Order—*Asparageæ.*

Asparagus—
(555) lucidus (Lindl.).

Dianella—
(556) odorata (Bl.).

XV. Order—*Junceæ.*

Juncus—
(557) alatus (Fr. et Sav.).
(558) bufonius (L.).
(559) communis (Miq.) *var.* effusus.
(560) Leschenaultii (J. Gray).

Luzula—
(561) campestris (D. C.).

COHORT XV.—GLUMALES.

XVI. Order—*Cyperaceæ.*

Carex—
(562) confertiflora (Boot.).
(563) gibba (Walhb.).
(564) incisa (Boot.).
(565) neurocarpa (Max.).
(566) picta (Boot.).
(567) trichostylos (Fr. et. Sav.).
(568) vulgaris (L.).

Cyperus—
(569) difformis (L.).
(570) rotundus (L.).

Fimbristylis—
(571) autumnalis (Rœm. et Sch.).
(572) diphylla (Vahl.).
(573) Japonica (S. et Z.).
(574) miliacea (Vahl.).
(575) squarrosa (Miq.).

Lipocarpha—
(576) microcephala (Knuth.).

Scirpus—
(577) Japonicus (Miq.).
(578) maritimus (L.).
(579) mucronatus (L.).?
(580) ononei (Fr. et Sav.).
(581) Yokoscensis (Fr. et. Sav.)

Zoysia—
(582) pungens (Willd.).

XVII. Order—*Gramineæ.*

Adenophora—
(583) latifolia (Fisch.).

Agrostis—
(584) perennans (Tuck.).

Alopecurus—
(585) geniculatus (L.).
(586) Japonicus (Stend.).

Andropogon—
(587) brevifolius (Sw.) *var.* pulla (Fr. et Sav.).

Arthraxon—
(588) ciliare (Beauv.).

Arundinaria—
(589) Japonica (S. et Z.)

Avena—
(590) fatua (L.).

Bambusa—
(591) Kamasasa (Zoll.).

Beckmannia—
(592) crucæformis (Host).

Brachypodium—
593) Japonicum (Miq.).
(594) sylvaticum (Rœm. et Schult.).

Bromus—
(595) Japonicus (Thb.).

Cynodon—
(596) dactylon (Pers.).

Eleusine—
(597) indica (Gærtn.).

Eragrostis—
(598) ferrugiana (Beauv.).
(599) megastachya (Rœl.).
(600) pilosa (Beauv.).

Eriochloa—
(601) villosa (Kunth.).

Eularia—
(602) Japonica (Frin.).

Festuca—
(603) parvigluma (Stend.).

Gyceria—
(604) caspia (Frin.).
(605) Japonica (Miq.).

Gymnothrix—
(606) Japonica (Kunth.).

Hemarthria—
(607) compressa (Rob.)

Hierochloa—
(608) borealis (Rœm et Schult.).

Hydropyrum—
(609) latifolium (Griseb.).

Imperata—
(610) arundinacea (Cyr.).

Isachne—
(611) Australis (R. Br.).

Ischæmum—
(612) distachyum (S. et. Z.).
(613) latifolium.

Kœleria—
(614) cristata (Pers.).

Leersia—
(615) orizoides (Pers.).

Panicum—
(616) acroanthum (Stend.).
(617) Burmanni (Retz.).
(618) crus-galli (L.).
(619) excurrens (Frin.).
(620) glaucum (L.).
(621) indicum (L.). *var.* contracta (Miq.).
(622) viride (L.).

Paspalum—
(623) Thunbergii (Kunth).

Phalaris—
(624) arundinacea (L.).

Phragmitis—
(625) communis (Frin.).

Poa—
(626) sphondyolodes (Frin.).

Polypogon—
(627) littoralis (Sm.).

Schenodorus—
(628) remotiflorus (Miq.).

Spodiopogon—
(629) sp ?

Trisetum—
(630) cernuum (Frin.).

CLASS II.—GYMNOSPERMÆ.

Tribe—*Abietineæ.*

Tamarix—
(631) Chinensis (Lour.).

Pinus—
(632) parviflora (S. et Z.).

Tribe *Cupressineæ.*

Chamæcyparis—
(633) obtusa (S. et Z.).

Tribe—*Taxineæ.*

Cryptomeria—
(634) Japonica (Don.).

Taxus—
(635) cuspidata (S. et Z.).

SUB-KINGDOM II.—CRYPTOGAMIA.

Order I—*Filices.*

Aspidium—
(636) aculeatum (Doll.) *var.* Japonicum.
(637) decursive-pinnatum (Kze.).
(638) erythrosorum (Eat.).
(639) falcatum (Sw.).
(640) lacerum (Sw.).
(641) sophoroides (Sw.).
(642) tripteron (Kunz.).
(643) varium (Sw.).

Asplenium—
(644) incisum (Thb.).
(645) nipponicum (Mett.).

Davallia—
(646) hirsuta (Sw.).
(647) Wilfordii (Baker.)

Gymnogramme—
(648) Totta (Schlecht).

Lygodium—
(649) Japonicum (Sw.).

Onoclea—
(650) sensibilis (L.).

Osmunda—
(651) regalis (L.) *var.* Japonica (Milde).

Polypodium—
(652) lineare (Thb.).

Order II—*Equisetaceæ.*

Equisetum—
(653) arvense (L.).
(654) palustre (L.).
(655) ramossimum (L.).

Order III—*Salvineæ (Bartling).*

Azolla—
(656) pinnata (R. Br.).

Order IV—*Lycopodiaceæ.*

Lycopodium—
(657) serratum (Thb.).

Order V—*Isoeteæ.*

Isoetes—
(658) Japonica (R. Br.).

APPENDIX.

(659) Keiskea Japonica (Mig.).
(660) Pollia Japonica (Horust.).
(661) Phteirospermum Chinense (Bunge.).
(662) Idesia (polycarpa Max.).

I remain, Sir,

Yours respectfully,

J. PLAYFAIR McMURRICH.

Professor of Biology and Horticulture.

PART IV.

REPORT

OF THE

PROFESSOR OF VETERINARY SCIENCE.

GUELPH, DECEMBER 31ST, 1883.

To the President of Ontario Agricultural College :—

SIR,—I have the honour to lay before you the first annual report of work done in connection with the Veterinary department of the Ontario Agricultural College. Although this department has been in existence since the inception of the College, no description of the work done in this section of the teaching of the institution has ever been submitted to the public. On that account I will endeavour to put before you the duties of the head of the Veterinary department, and the manner in which they have been carried out. It is the duty of the Veterinary Surgeon not only to attend to all matters in connection with the teaching of the various subjects necessary to a veterinary education, but also to attend professionally any of the live stock on the farm that may require medical treatment, as well as to make any suggestions and arrangements that will in his opinion tend to the conservation of the health of the various animals kept on the farm. Of course it is not to be expected that at an institution of this kind, circumstances will admit of a thoroughly practical and theoretical veterinary education being given, but the advantages are of such a character, that a careful student may carry away a knowledge of the more prevalent and simpler diseases, as well as ideas of how to prevent and combat them when they have made their appearance. He is also put in a position to be able to recognize any departure from health, which is a most important matter, as it gives an opportunity of resorting to means of relief at an early period, thus often materially and favorably influencing the termination of a case. His attention is so drawn to morbid conditions of horses, as to render him capable when purchasing, or under other circumstances, of discriminating between soundness and unsoundness. The possession of such knowledge by stock-raisers in rural districts, where the services of qualified Veterinarians cannot be obtained, or only after much delay, is invaluable.

Since I have stated the amount and kind of knowledge a student has the privilege of gaining in my department, I will now describe the method which is pursued in allowing an opportunity for the attainment of that knowledge. The student on entering the college at the beginning of October, commences the study of Veterinary Anatomy, by taking the horse as the standard ; and after investigating and studying the manner in which that animal is organized, the more important differences existing between him and ruminants are considered. Two lectures a week are devoted to this subject during the fall and winter terms ; but, unfortunately, the only means of practical demonstration that is afforded by our present facilities for teaching is a skeleton of the horse, and some detached bones ; and, although they are quite sufficient for teaching practically that

branch of the anatomy, they come very far short of providing material for the practical teaching of the numerous other branches, which I may almost say are of even more importance ; but I will allude to what is required in this and other branches further on. Anatomy then is the only veterinary subject that the student has to engage his attention during the first winter, with the exception of a brief consideration of the physiology of the different structures and organs that come under our notice in the anatomy. It is not necessary for me to go into the physiology more minutely, as the Professor of Biology gives a course of lectures on human physiology, which so closely resembles that of the lower animals, that a reference to the chief differences is all that is required to be given by me. This closes the student's anatomical studies; and during the next or spring term, he applies himself to the study of "Veterinary Materia Medica," or to gaining a knowledge of the drugs that are of most importance in the treatment of the diseases of the domestic animals.

If a satisfactory examination has been passed in the above mentioned subjects, he is then admitted into what is called the "Second Year." In this senior class, they have two lectures a week, on what has hitherto been styled in the curriculum "Hippopathology" ; but this term is not sufficiently comprehensive to express what is taught to this class, and would be more correctly designated "The Principles and Practice of Veterinary Medicine and Surgery." In the somewhat limited time we have to devote to this subject, which in the present enlightened days has assumed such vast proportions, it is continually our aim and object only to deal with such of the diseases that are most commonly met with, and are consequently of most importance, so that the student may not be puzzled, but be able to carry away with him something that will admit of practical application. The students of this class also receive another lecture weekly, called a "Practical Lecture." This hour is devoted to keeping up as nearly as circumstances will permit with the theoretical ones, and giving practical demonstrations wherever admissible. For instance, when any of the animals on the farm are suffering from any disease, I take the students to the stable, and deliver a clinical lecture to them, by considering all the symptoms presented ; the cause for the symptoms, the advisable treatment to pursue, and, in fact, discuss generally all the different phenomena the case may present to our notice. Opportunities of this kind, however, are not always presented to us ; but there are other practical matters which are always available for demonstration, and which I will explain. These are the different modes of administering medicine to animals ; for there is no use in telling a student to give a drench in some case, a ball in another, a hypodermic injection or an enema in another, without indicating to him how this is to be carried out. For this purpose, and for numerous others, I procure old and useless horses as subjects for doing anything with that is required, which will not cause the infliction of much pain. After medicines have been given in the various ways, we find out the situations in which the pulse may be taken, and the manner of doing so, as well as taking the temperature. Catheters are passed in the male and female ; the various modes of restraining animals for operations are shown by means of the twitch, side-lines, hobbles and ropes ; and the manner of producing insensibility to pain during operations, by the administration of anæsthetics, as chloroform and ether. The mouth is examined, and the abnormal conditions that are oftenest met with are described ; and the means of overcoming them are pointed out, whether by operation or otherwise. After the different kinds of fractures have been discussed in the lecture room, the treatment of such conditions is gone through; as, the application of splints of the various kinds, and putting the animal in the most favourable position by means of slings. All the minor operations are performed, such as putting in setons, bleeding, firing, puncturing in tympanitis, tracheotomy, passing the probang, neurotomy, trephining, drawing teeth, etc. In any of the above operations, which cause the infliction of much pain, sensibility is destroyed by the use of anæsthetics. Cattle and sheep of different ages are brought into the lecture room, and their mouths examined, with a view of showing the students the appearance presented by the mouth at the different ages, and the use of the teeth as age indicators. The external conformation of the horse is considered, and the names of the different sub-divisions—usually called points—are given, and each of these points is taken up, and the most desirable formation for it described, whether for light or heavy horses. These points are not only

considered separately, but in the aggregate, so that an estimate may be formed of what is desirable in the horse for speed, strength, and endurance, and the opposite conditions guarded against. Towards the end of the session, the subject is destroyed and a couple of hours spent in dissection, which of course is of a rough character, and more with the object of pointing out the situations of the various organs than for anything else. Now, sir, this is a brief outline of the work done by me in connection with the ordinary class, with the exception of acting as examiner to them in the different subjects.

But last year a number of students presented themselves at the College, whose time was limited for attendance there, and who wished to devote what they had to spare to the study of agriculture, live stock, and veterinary surgery. I was appealed to regarding my department, and asked what I could do in the way of profitably employing the time of these gentlemen on veterinary subjects. On enquiring into the knowledge possessed by the members of this class, I found that some of them had studied Anatomy, others Materia Medica, while others had never had any teaching in these subjects. Now here was a class occupying an anomalous position, their attainments being so varied that it would have been wasting the time of one portion of the class to go into the foundation subjects, while others were incapable of understanding more advanced branches, from a want of previous training in Anatomy, Physiology, and Materia Medica. After duly considering the matter, I came to the conclusion that a course on Veterinary Obstetrics would be the most beneficial to them I could give, not only on account of its being one of paramount importance to the raisers of stock, but also from the fact that gaining a knowledge of the anatomy and physiology of the genital organs would occupy a comparatively short time, and allow them to devote themselves to something really practical. After spending three or four lectures in treating of the genital organs, we took up the subject proper, which consists in a study of all the phenomena in connection with the process of reproduction. We began at puberty, and considered its advent in the different domesticated animals, and the signs by which its arrival can be recognized. The conditions called heat, rutting, or œstrum, was treated of, the symptoms of its presence, the time it lasts, the time of year it makes its appearance, and the spaces of time between its recurrence in the different females. The signs of conception were given, as well as the normal periods of gestation, and the variations therefrom noted. Sterility was spoken of, its prevalence, and the mode of overcoming it—where possible—considered. Abortion was defined, its causes, etc., discussed, as well as the means of avoiding such a calamity. Parturition next engaged our attention; the causes of it, the symptoms of its approach, and the variations occurring even when that act is carried out normally, as well as the deviations from it, and the means of affording relief when such deviations occur. This latter subject is a very extensive one, and takes up a length of time. The study of it is begun by describing the normal position of the fœtus in the womb—some time prior to parturition—and the change of position which takes place on the approach of that act. The normal presentation, or the only one which will admit of that act being carried out without extraneous assistance, is spoken of, as well as the departures from this natural state of affairs—which are numerous—and the means of bringing about the most favourable issues, when such departures arise. This necessitates a description of the instruments, modes of manipulation to be pursued, and the manner of performing the different operations.

It is my intention this year to demonstrate by means of large diagrams, the position of the genital organs and the fœtus in the womb as well as the normal and abnormal presentations, thus forming the best substitute for clinical instruction; other forms of difficult parturition are considered, as those arising from obstruction in the genital passages of the mother, whether the result of disease, or unfavourable conformations, and also the diseased conditions of the offspring; the care and treatment of the mother before, during and after parturition is discussed, with a view of showing how to bring that act to a favorable termination, and how to avoid subsequent disease; the treatment of the offspring is also dealt with as the means of resuscitation to be employed if necessary, and the general care which may be required before the young animal is sufficiently developed to exercise its natural instinct of looking after its own nourishment. The study of the phenomena, and contingencies of reproduction would not be complete unless the

diseases, which frequently occur during the period that the young animal is carried by the mother, also those that occur as sequels to parturition, as well as those ailments to which young animals are particularly prone.

What I have given is an outline of what I teach in the college, and last year I delivered nine lectures a week, bearing on the different subjects described, having to repeat those given on anatomy on account of the first year being divided into two classes; but so far, this year, no such division has been made, consequently I only have seven a week.

From looking over the curriculum, and constitution of the College, no one could arrive at a correct idea of the position held by the head of the Veterinary department, in comparison with the heads of other departments; of course this is a matter affecting myself personally, and if it had no other influence it would be out of place for me to mention it here; but as I, with others, consider that it materially militates against the good results that might be accomplished by this department, it would be delinquency on my part to omit to draw attention to it. All the other officers that have been appointed in connection with this institution were so situated, that all their time and attention could be devoted to the work of their office, but such is not the case in my branch, for it seems that the position is looked upon as a perquisite to my practice, which it very materially interferes with, as does the practice with the teaching.

Now it may be asked why the arrangement should differ from that with the other lecturers. Is it because there is less work in this department, or is it on account of the subjects taught being of secondary importance to the students? An inquiry into the matter would show that there is as much to be done, as in some of the other departments in the lecture room alone, and in addition to that there is the medical treatment which has to be bestowed upon the animals on the farm, and to which all my other actions and duties have to be made subservient, the delivery of the lectures and going to the college and back, although occupying considerable time, does not constitute by any means all the work to be performed; for there is the preparation of all this matter in the way of so arranging it that is may be received and assimilated by the students, who are non-professional, in a manner most conducive to its bearing practical results. As to the importance of the subject in a semi-stock-raising country, I think we need not fear the opposition of the most sceptical, when we aver that it stands second to none; as an indication of how the students estimate and appreciate the subject, I have but to mention that they are unanimous in asking for more time to be bestowed upon it. It requires not the constant petitions from the students which I am receiving to show me that time is all that is wanted to render the teaching much more practical and beneficial. I will now try to point out how more time could be beneficially employed in addition to perfecting the work that is at present being done. Of course it would be impossible in an institution of this kind for all the students to dissect; and the only way I can conceive of, to supply this almost indispensible means of learning anatomy, is to have the different parts of animals already dissected and brought into the lecture room, and there explained, of course this would entail a great deal of extra work on the lecturer, but would amply repay for the time thus spent. In the summer term the "Second Year" should receive a course on Veterinary Obstetrics, which according to the present arrangement of affairs, they are unable to do, and consequently complete their term without an opportunity being afforded them of studying one of the most important branches of Veterinary Surgery; there is no department that could furnish more numerous and interesting specimens for the museum than the Veterinary Department, if time were only available for their preparation. The treatment and diseases of sheep, especially in the lambing season, could, with benefit not only to the students, but to the public at large receive that attention that the importance of the subject demands. This is a subject that has received very little attention up to the present time, and there is comparatively little literature on the subject owing to the fact that facilities for study and observation are not easily procurable by the profession; but there would not be this difficulty here, where two hundred sheep are kept, if no other ties prevented the means of constant observation and study, which is essential to the correct recordance of data bearing on the subject, a closer observation might be made, and and a more general supervision gives to all the animals on the place, and the students'

attention directly drawn to the avoidance of dietetic errors, and the observance of sanitary rules generally.

Since my appointment to my present position, there have been no losses of a serious character, from death among the stock, with the exception of the mortality of some forty lambs last spring, caused by "Tape-worm", an account of which I gave at the time of its ocurrence, in a letter written to one of our local papers, and which I will append to this report, as it gives all particulars concerning it. Considering that most of the stock are highly bred, and are often subjected to a process of forcing for experimental purposes, I think we may say that we have comparatively little sickness amongst the animals, and what does occur is chiefly the result of accidental causes. The usual ill effects of high feeding are to some extent prevented by the regular manner in which the animals are fed, and the careful attendance they receive generally. We have had some trouble, and some loss has been occasioned by a hereditary and constitutional disease among the cattle, called "Tuberculosis," which disease is unfortunately only too prevalent among the better bred cattle of this country, the chief losses that were sustained, were among the "Polled-Angus" breed, a breed that were supposed to enjoy an especial immunity from this disease. One of the cows of this breed that was imported, seems to have had the germs of the disease lying latent in her system at the time of her arrival here, as she transmitted it to all the progeny that she produced after that time, but a considerable period elapsed before she developed any local manifestation of it herself. She was fattened and slaughtered, and a *post mortem* examination revealed tuberculous deposits in the peritoneum, liver, lungs, pleuræ, and also a very extensive one in the abdominal muscles of the left side, which was plainly to be seen before death. Two of this cow's progeny succumbed to the same disease; the tubercular matter in these cases selecting the glands at the posterior part of the throat to deposit itself in. Death would have resulted from suffocation in a short time if these animals had not have been slaughtered; a thoroughbred shorthorn cow also fell a victim to this disease, presenting very distressing symptoms at times, for some months previous to death; she had deposits in a variety of organs, but the one causing the greatest trouble was situated in the vocal cords of the larynx and which would have caused death in the same way as the two preceding cases. I have yet another case of this fatal disease to relate, which occurred in an Aryshire cow, the symptoms of which became so aggravated as to necessitate slaughtering during the preparation of this report. Another phase of the disease was presented in this case, for in addition to a want of thrift, there were well marked symptoms of partial paralysis, accompanied by brain disorder; on making a *post mortem* we found some minute tubercles situated in one of the coverings of the brain, which would account for the brain disturbance shown; the chest on being opened was found literally lined with tubercles, the lining varying from an inch to three inches in thickness, and was closely attached to the ribs and diaphragm throughout, as well as to the lungs in places. The greater portion of the lungs were in a normal condition, but that surrounding the heart for a thickness of three inches, was a mass of deposit; there was also a deposit in the womb accounting for abortion taking place the last time she was pregnant. Since I have given you the history of several cases of this affection, it may be as well to give a short account of the disease.

Tuberculosis.

The term "tuberculosis" implies the existence of a disease in an animal which is characterized by the presence of tubercles or small tumours in some part or parts of the body. This term is often confounded with "scrofulosis," which merely means the presence of a constitutional taint that predisposes to an attack of tubercle, while this latter is but the local expression of the constitutional taint known as Scrofula. *Symptoms*: This disease may be acute, but is generally chronic. The onset is insidious, and easily overlooked, tubercles often being found in animals killed in prime condition. We have an example of this in the first case I related—the one in which there was a deposit in the abdominal muscles—for this animal gained weight at the rate of two and a half pounds a day, and there were extensive deposits in her, but the function of no important organ appeared to be interfered with. After a varying time symptoms of the disease are generally

shown, which vary according to the seat of the deposit, yet there is a constitutional condition common to all, giving rise to a similarity of symptoms. In milking cows the earliest signs are those of unthriftiness. The quantity of milk given may not decrease for some time, but it is of poor quality, being thin, blue, and watery. If the cow be in calf abortion is apt to occur; if not pregnant, the condition called nymphomania, (constant heat) is frequently present. In any of the ox tribe, when so affected, the appetite is capricious, the mucous membrane pale, occasional dryness of the nose, heat of the horns and ears, slightly increased temperature (102°), weak accelerated pulse, a dry cough of a dull character exists, the skin looks dull, and the hair dirty. Hastened breathing is sometimes observed, especially when the disease has made much progress, and markedly so on exertion. Emaciation proceeds more or less rapidly, and the cough becomes more troublesome. The digestive organs are weak, the rumen prove to tympanitis, and in some cases diarrhœa sets in, which soon carries off the animal now become a mere skeleton. The terms "Wasting," "Consumption," and "Pining" are often applied to this disease, which have arisen from the prominence of the above mentioned symptoms in some cases. Lameness is sometimes present, with no local signs, but a *post mortem* reveals tubercular inflammation of a joint or joints. Tubercular tumours often present themselves in the neighbourhood of the lower jaw, appearing as round, moveable, painful nodules, which gradually enlarge, and become attached to the skin, which inflames, and finally ulcerates, leaving a raw and unhealthy surface, with no tendency to heal, which distinguishes it from an ordinary abscess, and with which it is apt to be confounded. These tumours may be found in any part of horned cattle.

The above symptoms are present in many phases of the disease, but are subject to modification, and variation, according as any organ is more particularly the subject of deposit, its function being interfered with in direct ratio to the amount of such deposit, thus giving greater prominence to the symptoms of an organic lesion in one case than in another.

Causes.

Animals no doubt inherit a tendency to the development of this disease, which is excited by various adverse circumstances, such as food deficient in quantity and defective in quality, improper ventilation, prolonged milking, etc., "*In and in breeding*," has certainly developed the constitutional taint in some strains that are notorious for the development of tubercle, *early*, *late* and *overbreeding—i.e.*, breeding from animals at an age when their tissues are imperfectly formed, or worn out. Over-breeding or not allowing sufficient time for the system to strengthen after calving, before again allowing conception to take place. It occurs, however, under the most favourable circumstances, and has been noticed as a congenital condition. It appears, from recorded facts, that tuberculosis may be transmitted under favourable circumstances, from the actually diseased to the healthy. These conditions are cohabitation, partaking of milk from tuberculous subjects, and the using of their flesh as food.

It is found to be dependent on a microscopic organism, which has actually been separated from tubercular matter, and cultivated; and on inoculating healthy animals with the result of this cultivation, tuberculosis has resulted. This shows conclusively that this organism, which is called the bacillus of tubercle, is the cause of the disease, and in any way that this can gain admission into the system, in this way may the disease be caused.

Post Mortem Appearance.

Scarcely any part of an animal seems exempt from tubercular deposit, so it may be looked for in any situation, but is most frequently found in the chest in connection with the lungs, and pleuræ. The deposit may consist of one tubercle or of a number congregated together. They vary in size from a millet-seed to that of a nut, having a greyish colour, spherical form, and firm consistence. This is the highest state of development in which they are found; but they are subject to retrogressive changes, and consequently are seen in various stages of degeneration. The most frequent change, the result of degeneration, is the conversion of the nodule into a cheesy-like matter, which change begins

in the centre, and involves more or less of its substance, giving it a yellowish appearance, when cut into. In some cases the tubercles assume a consistence resembling that of cartilage. In connection with both these conditions is frequently found a deposit of some of the salts of lime, which gives the matter a gritty feeling when pressed between the fingers. These are the most noticeable features observable, on making an examination of this kind.

Treatment.

If any means of relief are to be resorted to, they should consist of placing the animal under the most favourable conditions, as to surroundings, allowing warmth, pure dry air, and attention to cleanliness. The food should be nutritious, and contain abundance of fat, as linseed, corn, peas, etc. Tonics and restoratives may be given, consisting of Cod-liver or linseed oil in small doses; and sulphate of iron combined with gentian or cinchona.

However, it is doubtful if it is ever advantageous to resort to treatment, as it is rarely successful; and if it were, it is not desirable to preserve an animal for breeding purposes, which is very liable to hand down to its progeny a predisposition to the disease. There are also very grave suspicions held by the most scientific and keen observers of the present day, that the milk and flesh of infected animals are likely to prove media for the transmission of this disease to human beings; for the tubercle of man and cattle are held to be identical. So much has this impression gained currency among the profession, that it was one of the chief subjects discussed at "The International Veterinary Congress," held during September of this year at Brussels in Belgium. There were present at that meeting representatives of nearly every seat of Veterinary learning in the civilized world, and the conclusion arrived at was, that consumers of meat from an animal affected by this disease in any form ran a decided risk of incurring the malady. Some animals are much more prone to the disease than others, those of the ox tribe being particularly susceptible; and next in order among the larger animals come the pig, while the sheep and dog are comparatively exempt. It is extremely rare in the horse, some of the oldest and most experienced practitioners never having seen it.

The extent to which this disease exists, amongst the better breed of cattle in this country, is alarming, for many reasons; not the least one of which is the danger to which the public are exposed from the consumption of meat from such animals. From an economic standpoint the outlook is serious, as the annual loss must be very great, and will continue to become greater, as long as so little care is observed in the selection of healthy dams and sires. Of course a great deal of this is unavoidable, from the difficulty of diagnosing the disease in some of its forms, and the undecided symptoms shown in the earlier stages, as well as the inability, on the part of breeders, to realize the seriousness of the condition even when shown most unmistakably. Added to this, many people show a selfishness and criminal negligence in taking no precaution against its dissemination by heredity among cattle, and its propagation amongst human beings, by allowing the sale of the meat from infected animals, even when it is pointed out to them by the Veterinarian.

In addition to the symptoms already mentioned of this disease in cattle, it may be as well to state the kind of physical conformation which is often possessed by these animals that show a peculiar predisposition to the malady. They have light barrels, narrow chests, disproportionally long legs, with attenuated necks and ears, and horns set close together. Some observers consider that those of a light colour are more prone to the disease, especially light roans.

The disease amongst the cattle to which my attention has been most frequently called is that of "Foul in the Foot," and it has certainly caused a great deal of trouble and annoyance; but no loss has resulted, with the exception of preventing the animals from thriving as they should have done during the trouble. In order to convey a more correct impression of what we have encountered, it will be necessary for me to give a brief description of this disease.

Foul in the Foot.

This is an inflammation of the interdigital substance, of varying intensity, which may extend, and involve the sensitive structures within the digits, as well as cause death of the bones (necrosis) as far up as the fetlock joint.

Causes.

Pre-eminent among the causes of this condition is filth, as standing in a stable or loose-box, in which the manure is allowed to accumulate, or when a stable is floored with plank, and constant soakage has taken place, resulting in the collection of a material, that is constantly undergoing decomposition, which causes the evolution of gases of an irritating character, and which, coming in contact with the sensitive interdigital substance, produces inflammation. Overgrowth of the hoof, causing a strain on the internal structures. The irritation caused by dirt collecting between the digits, or any injury or condition causing irritation sufficient to produce inflammation of that part. Tubercular deposits also give rise to a very serious form of the disease.

Symptoms.

Lameness is always present, which may be so severe as to cause fever, and loss of appetite; and, when the bones become involved, the suffering is sometimes very great, causing the animals to lie down and groan with pain, and, in some cases, death results. In milder cases, on examining the affected foot, the substance between the digits will appear raw and red, and cracks are frequently present, with a discharge of pus which may have a fetid odour, especially if it has burrowed underneath the horn. There is sometimes a swelling above the coronet, which may extend as high as the fetlock joint, and if the bone is involved, abscesses may be formed in that region.

Treatment.

Remove the cause, and, if from filth, it is often better to change the animal to another and more favourable situation. Pare the hoof into its natural form, if required, and also remove any portion of it that is underrun with pus. Apply warm poultices until the pain is relieved, afterwards keep the part clean and enveloped in a bag. In most cases the application of mild astringents, and antiseptics is sufficient, as a drachm each of acetate of lead and sulphate of zinc to a pint of water, mixed with a two per cent. solution of carbolic acid, and applied once daily after cleansing. If what is vulgarly called proud flesh (fleshy granulations) appear, the pure carbolic acid may be applied for once or twice. When the bones are much diseased, it is sometimes advisable to amputate the limb above the diseased portion, which will admit of the animal being prepared for the butcher.

I attribute the frequency of the occurrence of this affection among the cattle of the College to the condition of the flooring, which is of plank, and has been down for a great number of years; consequently there must necessarily be a large accumulation of filth, and the conditions that result from it. Of course the cattle are more or less predisposed to an affection of this sort, from the fact of their generally being in a plethoric condition, the result of high feeding.

To prove that the cause I have mentioned, as operating in these cases, is the correct one, I have but to state that any of them very seldom yielded to treatment until I had them moved to another building. On this account I advised having the floor taken up, and the place thoroughly cleansed, before putting down again; but it was not thought advisable to do this, as there is some talk of our having new buildings.

Stable Floors.

I don't wish it to be inferred from this, that I am opposed altogether to plank flooring, for I think it presents advantages in some respects, as it can be more cheaply taken up and replaced than any other kind made; but when holes are bored in it to allow

the urine and fecal matter to drain through and collect below, it becomes an abomination. I think on the whole that the cedar-block pavement is the most convenient, and best calculated to keep a building in a healthy condition, if the blocks are laid in any substance that will tend to prevent percolation, such as a puddle of clay. But there is no doubt, if it were always practicable to have abundance of litter continually underneath animals, which would absorb all moisture, and admit of it being removed regularly, then we should have an arrangement most conducive to health.

I am sorry to say that this is not the only part of the stabling arrangements that is defective, and any one glancing at our main building, which affords the major part of the stabling accommodation for the cattle, could easily see that it does not afford what modern sanitarians consider is indispensable to health, viz.—light, ventilation, sufficient warmth, and pure, dry atmosphere. But, however, these considerations can hardly be remedied short of the erection of a new building.

We also find that there is insufficient room for the amount of stock kept, which necessitates crowding, making it inconvenient, and unwholesome at any time, but which is much more noticeable when any of the stock are sick, as it prevents their isolation, which is so desirable to the patient at all times, and necessary as a means of prevention in some cases to the unaffected.

I think I have drawn attention to most points of interest in connection with what I have observed and encountered on the farm, and have described more fully than will be required in any subsequent report, the mode of my teaching, the subjects taught, and the way in which the teaching of my department might be rendered more efficient; consequently I will conclude,

Having the honour to be,

Sir,

Your obedient servant,

F. C. GRENSIDE, V.S.

APPENDIX.

TAPE WORM IN LAMBS.

Having lost some forty lambs at the Agricultural College, and hearing that a number of farmers in the different parts of the Province have been suffering similar losses from the same cause, I thought it might prove interesting, and perhaps instructive to sheep raisers, if I related my experience in connection with this serious mortality. There is perhaps no province or country of the size of Ontario in the world that enjoys immunity from disease of an epizootic, infectious or contagious character among the domesticated animals to the same extent that we do in this province. On this account it is natural for us to become considerably alarmed and wary, when we see one of the resources and food supplies of the country endangered. It certainly behoves every veterinarian who has encountered the disease I am about to speak of, to lay his experience before the country, so that from the aggregate of experiences a correct knowledge of this disease may be gleaned.

The disease which I am referring to is caused by the tape worm. To the presence of a species of this genus of worms in the bowels of the lambs is the whole trouble due. It is called the expanded tape-worm *(Tenia Expansa)* on account of the breadth of the segments, and has been found in the intestines of the goat and ox, as well as those of the sheep, but most frequently in the latter, and from the ravages it has caused among these animals especially in Germany, it has given rise to what is called the tape-worm plague. It is pretty certain that previous to this year, this disease has not caused much

loss in this country, for Prof. Smith—the most experienced veterinarian in this Province —whom I consulted, and in whose company I investigated the present outbreak, had not previously had his attention drawn to similar cases. Veterinary literature on this subject is most meagre, and any that I have been able to find merely mentions the disease as having been noticed, without giving any of the symptoms or history. But Professor McMurrich has kindly procured and translated for me a pretty minute account of the disease from an eminent German Helminthologist's work; and as this tallies to some extent with what I have observed, I think I cannot do better than give what he says on the subject. He says "the expanded tape-worm does not often make its appearance singly, and when it does no marked sign of sickness is the result. It is most commonly found among the lambs and shearlings of a flock, causing sickness in such large numbers that we may correctly speak of a tape-worm epizootic. The first symptom of this persistent flock sickness is the sheep presenting white skin and mucous membranes, light coloured wool from which the yolk is absent. Next they become emaciated, and cease to grow, although they eat and drink more than naturally. Digestive trouble soon appears shown by an unnatural sweetness of the breath, uneasiness, and symptoms of pain; the animal strains to void fæces, but often without success. The belly becomes swollen, caused by the collection of fæces and formation of gas. The animal becomes thinner and weaker and can only with great difficulty follow the flock. At times convulsions appear. If fæces are passed they are yellow and slimy, and frequently contain segments of the worm here and there The weakness and depression increase so that the patient remains lying on the ground unable to raise itself, and dies from exhaustion. By making a post-mortem the worms are sometimes found in a mass in the intestines, usually very long and much intertwined, often filling the canal in places completely." The same author says there is no doubt that the immature parasite is taken up by the sheep from the meadows, and that wet, boggy pastures are most favourable to the development of it. The first deaths that took place at the College occurred about the middle of May, after we had had a series of cold rains. Six lambs and a ewe were found dead by the shepherd one morning; this is the first intimation we had that anything was wrong with the sheep. Upon making a post-mortem on three of the lambs that died the nature of the disease was revealed, but it differed somewhat from the above quotation, as I found well marked signs of inflammation existing in the intestines as well as in the stomach. The severity of the inflammation seemed to be in direct ratio to the abundance of the worms. There must have been more than one hundred feet in some of the lambs, and they varied from one-sixty-fourth to one-quarter of an inch in breadth. After these deaths we kept a pretty close watch on the sheep but failed to detect any signs of sickness in any of them until three mornings afterwards, when there was another lot of six or seven of them found dead—some of which showed much the same post mortem appearances—and two or three suffering violently. Although there were well marked signs of inflammation of the bowels on making a post mortem on some of them, these signs were entirely absent in others. The symptoms before death differed also, some showing evident signs of abdominal trouble manifested by hurried breathing, constant changing of position, laying down, kicking, and tenderness on pressure over the bowels, while others presented the symptoms quoted from the German author, but in a very aggravated form. They exhibited great dullness and depression, reeled and staggered when moving, and showed loss of vision by running against fences, etc., and by the pupil of the eye becoming very much dilated, giving the organ a glassy appearance. On examining the brain and its coverings of one of them which showed these latter symptoms, evident signs of congestion were easily detected. Since the loss of this second lot such large numbers have not died at one time, but two or three kept dropping off every few days for a couple of weeks, with the symptoms just described, but in a much less acute form, in fact more like the German author has described. The shepherd says he never had a finer lot of lambs than these up to the time the disease began to show itself, but those that have survived are much lower in flesh than they ought to be. After the worms had evidently seriously deranged the health of the animals, treating them successfully seemed hopeless, so we directed our efforts towards the source of the trouble in those that had not yet showed any alarming symptoms, and we have been pretty successful. I first tried an infusion of pumpkin

seeds which has the reputation of acting well in such cases, but it did not prove effectual, which may be owing to some fault either in the preparation or in the manner of administering it. I will just state the course I pursued; I infused two ounces of the seeds in a pint of boiling water for five or six hours, and after keeping the lambs without food for some hours previous gave them two wineglassfuls three times a day until five doses had been given, and then gave them a purgative consisting of linseed oil. As no worms were expelled I thought I would try oil of Male Shield Fern, which I did the following way: I took ten drops of the oil and mixed it with three ounces of linseed oil, giving this dose to each lamb after fasting, and following in a few hours with a purgative dose of linseed oil. This caused a considerable number of worms to be expelled. I pursued a similar course of treatment again in a couple of days and a lot more were passed. This showed that oil of Male Fern can be relied upon for this purpose, and in order to thoroughly get rid of the worms it is only necessary to administer it in a proper manner. I think it would be better to give three or four doses following, allowing three hours between each dose and then follow up with a purgative, but of course it is a very laborious and tiresome undertaking to drench sixty or seventy lambs so many times, and it also seems to nauseate them to some extent. Full grown sheep take twenty-five drops of the oil of Male Fern. Of course the size of the dose must be regulated according to the age and size of the sheep. Those that I gave ten drops to were between three and four months old. It may be asked how it was that the immediate cause of death differed in the different cases, why some died of inflammation of the bowels, others with brain derangement, while others succumbed from apparent starvation. Of course the latter is the manner of death to be expected as the result of tape-worms in such numbers, and I think one might reasonably attribute in this case, the diverse modes of death to the modifying influences of the weather. For, as I stated before, that previous to the death of the first lot we had had a series of cold rains, which any one with any experience of sheep knows act most injuriously upon these animals, often causing inflammation of some internal organ or organs. Now, with the predisposing effects of the weather, and the presence of the worms to act as an exciting cause, there does not seem to be much reason for astonishment at the post mortem appearance revealed in the first cases. After the death of the first lot the weather moderated, and although we had repeated rains the temperature was higher, and the wind did not blow from the east, in fact the weather was less unfavourable. Without reasoning out the cause for the symptoms and post mortem appearance presented by the second lot, I may state that derangement of the digestive organs is not infrequently followed by brain disorder amongst ruminants. Of course, the matter of most practical importance in connection with an outbreak of this kind, is to find out the cause of the trouble and remove it if possible, but this, I am sorry to say, we have been unable to do.

In finding out the source of any species of tape-worm there is one thing to be remembered particularly in their life history, and that is that before the embryo can become developed into a mature tape-worm it is absolutely necessary for it to change its host or pass into some other form of animal life, and thence back again into the animal or animals it naturally infests. So that finding out the intermediary bearer of the worm is equivalent to finding out its source. Now, from the fact that wet weather has been found to influence the propagation of this species of worm, it is reasonable to infer that the intermediary bearer is some form of aquatic insect. On this account Professor McMurrich made a careful search in the field in which the sheep had been, and although he found a number of slugs, the microscope failed to reveal any signs of the presence of the immature tape-worm. This is the most difficult matter to solve in connection with the study of the life history of helminths; which can be understood when it is known that it is only within the last two years that the intermediary bearer of the "Liver Fluke" has been determined upon. This is the worm that causes "rot" in sheep, and there is no disease amongst ovines that has caused such serious losses to flock-owners in Great Britian as this one. So that no pains have been spared in investigating the life history of the cause, and it was only after years and years of toil that the matter was settled. I just mention this to show the difficulty of tracing the life history of worms and hence of removing our patients from the source of contagion. It is found that flocks grazing on

low pastures and marshy districts were much more liable to invasions of "Rot" than those on higher and drier grounds, but an exception is observed among sheep pasturing on salt water marshes. This would suggest as more than probable that salt proves destructive to the intermediary bearer of the fluke-worm, and if this is the case, and as we also suspect some mollusc or aquatic insect to be the intermediary bearer of the expanded tape-worm, it might be a good plan to spread a couple of hundred of salt to the acre over the pasture on which sheep become infected. As we are now speaking of means of prevention, I might state it would be a good plan if medicine is being given to cause the expulsion of the worms, to keep the sheep in a yard where there is no grass, and where the excrement could be collected and burned. And now, sir, apologising for taking so much of your space.

F. G. GRENSIDE, V.S.

Guelph, June 25th, 1883.

PART V.

REPORT

OF

THE PHYSICIAN.

ONTARIO AGRICULTURAL COLLEGE,
GUELPH, 29th December, 1883.

To the Honourable A. M. Ross,
Commissioner of Agriculture for the Province of Ontario:

SIR,—I have the honour to present to you my Annual Report.

This year we have to record one death, caused by rupture of a blood-vessel in a case of advanced Phthisis, in a young man twenty years of age, who had only been a short time in this country, and whom I had advised to return to his friends, which he intended to do had death not come so suddenly.

We have had very few cases of a serious nature, although we have had a good many of ordinary character.

I consider we have had a favourable year.

I still press the importance of having an isolated sick-room.

I have the honour to be, Sir,
Your obedient Servant,

E. W. McGUIRE.

REPORT

OF THE

PROFESSOR OF AGRICULTURE,

FARM MANAGER,

AND

EXPERIMENTAL SUPERINTENDENT.

Printed by Order of the Legislative Assembly.

Toronto:
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1884.

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PART VI.

REPORT

OF THE

PROFESSOR OF AGRICULTURE,

FARM MANAGER AND EXPERIMENTAL SUPERINTENDENT.

ONTARIO AGRICULTURAL COLLEGE AND EXPERIMENTAL FARM,

31st December, 1883.

SIR,—I have the honour to submit the Ninth Annual Report of the Outside Departments of this Institution.

In Agriculture, as in other businesses, men are apt to have their attention withdrawn from the older line of work by some new and possibly more interesting, and as valuable, branch of their own profession. I do not mean that the older is usually entirely neglected, but it certainly does not receive that fair measure of attention which its importance demands. We have a very marked example of this at present in GRAIN growing, along with the Live Stock interest of the Province.

Ontario has given as good wheat in quantity and quality as can be obtained anywhere else. Her early history in this specialty was very interesting, and, in my opinion, does not merit that form of censure now so common with some. I cannot join the unmeasured wail of the present moment in the United States and Canada about *disafforesting*, which is intimately related to this subject. It has always been, and still is, a national duty to overclear, so to speak. When modern scientists are but groping their way amongst "Trees and Climate," how reasonable we ought to be in commenting upon the pioneers of even a quarter of a century ago, whose meteorological knowledge was nothing without an untimbered sky and golden grain. Men long ago, and now, did not grow much of the non-essentials of life, in a new country. Life was too serious to be trifled with among Hemp and Hops, and even among Roots and Apples. I am not arguing advisedly with the Art and Science in saying so, because no art or science agrees with man's *easy* existence. To-day all the civilized world knows that man's bread and beef are *harder* on the soil than anything else. Those who blame for the Wheat growing of the past unthinkingly censure the very life blood of a new nation. Farmers of 1850, Ontario, were more justified in their agricultural practice than we are in some now prevailing; it was more legitimate under their circumstances to take Wheat and Wheat than it is for us to graze permanent pastures without systematic top-dressings.

But Ontario may have to take a second place in the extensive and cheap production of cereals, because the possession of the country westwards being in some respects a repetition of our own life, will produce cheaper, and maintain plant excellence better, than older lands can do. This new feature of our Dominion agriculture must be acknowledged in Ontario practice, and that practice made to tie with it. This position does not imply

that Ontario must give up her wheat area, or that the proper maintenance of varieties should be abandoned. I think, on the contrary, that it devolves upon us more than ever to give attention to these. Under the increasing fertility of our older lands, by the better system of farming and larger number of live stock kept per acre, Ontario is as able as ever to grow perfect Wheat—both winter and spring varieties. The fine old SOULE and FIFE have left us meantime—not for want of proper nourishment in climate or soil, but simply because in the regular course of their day as cultivated plants they require a change. We did not allow them that thorough recuperation by change to other climates and soils, which alone affords new life, and hence, serious disappointments and loss—that are too often ignorantly charged to other causes. It comes in as an interesting point in these considerations, whether our North-West Territories will send us back the Fife, Club, and White Russian, so reinvigorated as to give another lease of a quarter of a century. Meanwhile something else must be done.

It is considered to be the duty of the Legislature, in connection with this Experimental station, to maintain a system of grain testing, for ourselves, *as well as others.* I am of opinion that Ontario, by all her physical conditions, is better adapted for this purpose than any other position on the American Continent. European and United States experience say that the change of seed most suitable for them and us is from Southern Russia and Hungary, which have a climate in more respects resembling Canada than any other country. The Isothermal of 45° joins Ontario and the Black Sea district, which is still so famous for sound Wheats.

A good deal has been attempted during the last ten years in introducing new Wheats from the United States, both by private enterprise and this Experimental Farm, but, with few exceptions, they have failed, or were but short-lived. This was a natural consequence of bringing from the South to the North. The work must be accomplished through equal or more severe climatic conditions than the country proposed to be benefited, so that further attempts from the United States may be looked upon as fruitless.

It is not uninteresting in this connection to place on record that in November last I had a communication from Messrs. Oakshott & Co., the well-known Seedsmen, of Reading, England, submitting a number of varieties of Wheat, Barley, Oats and Peas to be experimented upon at Guelph. As evidence of their confidence in our work, they enclosed the following letter :—

"THE INSTITUTE OF AGRICULTURE,
" South Kensington, London.

" GENTLEMEN:

" I have the honour to thank you for bringing under my notice the series of experiments you purpose having carried out in different districts. Let me mention that at Guelph College they have facilities for carrying and testing such experimental results in a manner surpassed by none, excelled by few, if any. I think you should put yourself in communication with Professor Brown; for it is very probable that the College can give such valuable help as will surprise many in the old country. Wishing you every success in this great international work.

" HENRY TANNER.

"MESSRS. OAKSHOTT & Co."

International work of this kind—to which we have been invited in such complimentary terms, and to which I gave hearty response after consultation with the Department—is no doubt valuable in itself; but there is a larger and more immediate duty awaiting us. We should at once begin the purchase of wheats from Europe, not only for experimental testing here but immediate distribution throughout the Province. For this purpose I ask that $3,000 be placed in the Estimates for 1884, and that means be taken for a proper selection by a competent person, so that the fall of 1884 and spring of 1885 may be fully provided for in chosen parts of the Province.

I beg your best consideration to this important matter, which you will remember had the favourable view of the Legislature last session.

I now beg to submit another subject, of equal importance at least to Wheat: that subject is, the importation of LIVE STOCK for this Farm.

Cattle, Sheep and Swine are kept here for four great purposes :—

1. As educational agents for students, who are daily taught by handling, comparison, discussion of characteristics, conduct under similar conditions in the stall and on pas-

ture, and otherwise the whole practical standing of breeds and individuals, as suitable for different purposes.

2. As reference material for the farmers of the Province, both by personal examinations and experimental issue, through the important results of beef, mutton, wool, milk, cream, butter and cheese.

3. As immediately productive subjects in ordinary farm practice, as well as their distribution by public sale.

4. As on hand for improvement of other herds and flocks when required by service.

In each of these, our position, during the last eight years, has been not only highly satisfactory, but progressive and far-reaching.

We have had two systematic importations from Britain during that period: one in 1876, at a cost of $8,108, and another in 1881 that cost $6,250. In addition to these, other purchases were made to the amount of $2,530. Thus then, altogether, in our experience, $16,888 have been expended in the purchase of thoroughbred stock.

The amount of public and private sales, with service and wool, has been $31,876. The cost of management, with losses by death and non-breeding, on the one hand, and the value from manure on the other, is not easily calculated; but, taking a fair view of all circumstances, which would embrace the educational advantages in all their width, there results, at least, the sum of $11,000, as clear cash profit upon the investments. And besides this balance there are on hand animals valued at $5,000, though practically we are at present without any herds and flocks.

It is therefore proposed to import as early in 1884 as possible; and, in view of the reputation we have to sustain, as well as the desire on the part of almost every one that we should be in possession of *everything worth having*, I beg to submit the following:—

CATTLE.

Short Horn Bull and four Cows
Aberdeen Poll " " four "
Hereford " " four "
Devon " " two "
Galloway " " two "
Norfolk Suffolk Polls, Bull and two Cows
Ayrshire Bull and three Cows
Holstein " " three "
Jersey " " two "

SHEEP.

Lincoln Ram and three Ewes
Cotswold " " six "
Leicester " " six "
Cheviot " " three "
Oxford Down Ram and six Ewes
Hampshire Down Ram and six Ewes
Shropshire Down Ram and six Ewes
South Down Ram and six Ewes
Merino Ram and three Ewes

SWINE.

Berkshire Boar and two Sows
Poland China Boar and two Sows
Essex Boar and two Sows
Suffolk Boar and two Sows

Nine breeds each of Cattle and Sheep, and four of Swine. The least number of each on an average that should be got is one bull and three cows, one ram and five ewes, and one boar with two sows. Thus then, altogether, thirty-six Cattle, fifty-four Sheep, and twelve Swine.

With reference to the probable cost of these, it is well known that since I submitted a similar list—less two breeds of each—to the Government during last session, the value, owing to increased demand in Britain, has risen one-third at least. At the lowest computation, each cattle beast could not be less than $400, each sheep $50, and each pig $50, and as it costs, including every item, about $150 for cattle and $25 for sheep and pigs, to deliver at Guelph, there results a total requirement of $23,850. In this, no allowance is made for incidentals, nor for an additional animal of the same, or other breeds that might be recommended.

$30,000 would place us in a good position, and $25,000 would be risky. In this opinion I am supported by all who have made a study of the subject, and who desire to

place us above any other similar Institution on the American continent. Indeed, were it necessary to use influence, with yourself, or the Government in this matter, I could submit many communications from our own farmers and breeders, advising the importance of this third importation, and that at least $50,000 ought to be set aside for the purpose.

II. FARM CROPPING, 1883.

Our nine years' experience of Mixed Farming by a certain rotation and with a large proportion of live stock, under the physical conditions of climate and soil characteristic of this district, have made us certain of some things in science and practice :—

1. We find it is injudicious, as well as impracticable, to adhere strictly to a particular system or rotation in cropping.

2. We find it is indispensible on certain soils to have summer fallow for the eradication of weeds.

3. We find that one kind of grass does not make a pasture, and that pasture has to be fed like other crops.

4. We find it is possible to overdrain certain soils, and that deep drains remove water more rapidly than shallow ones.

5. We find that special manures are more than half removed by heavy rains and under-drainage, and that a manure to be most efficacious, must have a certain "body," size or length.

6. We find, on an average, that soils of medium fertility give more value of annual produce than others.

7. We find that rich, permanent pasture induces too high condition in breeding with certain cattle and sheep, without a change.

8. We find thistles following potatoes and hay more than other crops, and that it is not difficult to smother them out for several years with green fodders.

9. We find a northern aspect more reliable for a variety of crops than a southern or south-eastern one, on certain soils.

10. We find that foot-sore among sheep is not foot-rot, and that sheep or liver-rot has no connection with tapeworm.

11. We find the Hereford breed of cattle, and Southdown breed of sheep to be less subject to diseases than others.

12. We find mangolds to be easier and cheaper cultivated, more reliable, and a more valuable, February to May, food than turnips.

13. We find no trouble whatever in the "bad marking" of cattle, sheep, or pigs, by allowing breeds to run continually together.

14. We find that for the best results in forest tree culture, the young plants must be regularly cultivated for some years.

15. We find it a dangerous thing to have too few live stock and too much crop.

16. We find it a good thing at times to have small crops and much live stock.

17. We find it very tempting, in such a season as 1883, to take two crops of hay, and grow no green fodders.

18. We find we cannot maintain soil fertility without first-class farm-yard manure.

19. We find it is impossible to uphold the best conditions of cattle-life in winter, without roots.

20. We find it is easy to kill a beast in administering medicine, and difficult to save one after "bloating" with food.

21. We find no trouble, as yet, from patronizing the English sparrow.

22. We find it very difficult to grow a genuine gooseberry.

23. We find it simply impossible to train a Scotch collie dog, with one hundred shepherds, on one farm.

24. We find practically no deterioration of farm-yard manure, by proper management, in open courts, especially during a close winter.

25. We find no advantage whatever by washing sheep before clipping.

26. We find most clear and practical advantage in clipping lambs once, and all other sheep, twice a year, under certain conditions.

27. We find very little advantage to the animals by giving grain on first-class permanent pasture.

28. We find no such thing as a "rust-proof" cereal, nor a cow giving lots of milk on little food.

29. And we find mixed farming to be the most difficult, the hardest physically, the deepest mentally, and the most reliable of any other system.

Following is abstract of our farm cropping for 1883:

FARM CROPPING, 1883.

Field.	Area.	Extent of Crop.	Nature of Crop.	Quantity per acre. T., tons, B., bushels.	Total Quantities.
		10	Corn Fodder	20 T.	200
1	20⅓	10½	Late Oats	3 T.	33
2	19	19	Spring Wheat	21 B.	400
3	22	22	Pasture, 2nd year	.....	.....
4	9	9	Hay, 1st year	2½ T.	22
5	13½	13½	Hay, 1st year	2½ T.	33
6	25	25	Hay, 1st and 2nd year	2 T.	50 T.
7	20¼	20¼	Hay, 2nd year	2 T.	40 T.
8	22¼	22¼	Hay, 1st year	2¾ T.	60 T.
9	21½	21½	Pasture, 1st year	.....	.....
10	19	.....	Bare Summer Fallow	.....	.....
11	21¼	21¼	Oats	40 B.	850
12	18½	.....	Uncultivated Pasture	.....	.....
13	23	4	Pasture	.....	.....
		19	Peas	25 B.	475
14	24	.....	Experimental Plots	.....	.....
15	21½	21½	Hay, 1st year	2¾ T.	58
16	22¼	4¼	Peas	18 B.	81
		18	Winter Wheat	15 B.	270
17	20	8	Potatoes	100 B.	800 B.
		8	Mangolds	650 B.	5200
		1	Carrots	500 B.	500
		3	Vinery	.....	.....
18	19	13	Turnips	450 B.	5850
		.....	Uncultivated Pasture	.....	.....
19	30	16	Barley	35 B.	560
		14	Oats	70 B.	980
20	11	.....	Uncultivated Pasture	.....	.....
21	16⅓	16½	Pasture, 3rd year	.....	.....

Abstract of Farm Cropping.

	Acres.		
Grain	122	=	⅛
Hay and Fodder	121	=	⅛
Roots and Fallow	49	=	1/7
Pasture cultivated	64	=	⅕

Mr. Wood's report to me is as follows :—

To Prof. Wm. Brown :—

Sir,—I have the honour of submitting the following statement of the Farm and Live Stock Department. Three years and a-half have elapsed since I came to this Institution. One of the first cares after my appointment was to set to work and eradicate the remaining thistles with which some fields were badly infected.

Loose and fast stones held supremacy in some other fields. In former years my position was occupied by two, the work then was not so extensive and laborious as at present, in consequence of fewer students and stock.

Since my appointment we have summer-fallowed No. 6 field, removed fast and loose stones, stumps, and the second growth brush, and 4, 5, 14 and 16 fields were thoroughly grubbed out. From 1, 2, 7, 15, 17, and 18 fields fast and loose stones were removed. In field 14, now used for experimental purposes, there were from three to four acres of marshy land entirely overgrown with saplings; this is now utilized and efficiently drained. Our next attention was directed to the five uncultivated acres, in field 16, from which stumps and loose stones having been removed, were ploughed and sown with peas, the balance of it was underdrained, and is now in excellent condition for cropping. Although most anxious I have been unable to remove the stone piles from fields 19 and 21, but anticipate doing so at an early date. As soon as our present rotation of cropping will permit, field 19 should be summer-fallowed. It affords me much pleasure to state that the root crop, while a great success, proved in some cases unsuccessful in checking the growth of thistles. There is nothing in my estimation to surpass that of a bare summer-fallow for the thorough extermination of these formidable foes and to place the land in a good condition for the reception of fall wheat.

Herein will be found a narration of the crops gathered from the various fields during 1883, which, for quantity and quality we have reason to feel justly satisfied when we consider the many and numerous rain storms with which they were visited. That our labours have been amply compensated the following catalogue of productions will clearly denote.

Fields.

No. 1—Twenty acres, ten of which were sown with corn and ten with oats. The former at one time showed indications of great success, but being visited by early and severe frosts, proved a failure. The oats were intended as a test for self-binders, and is now used as fodder.

No. 2.—Eighteen acres, sown with wheat (White Russian), yielded twenty-one bushels per acre.

No. 3.—Twenty acres, are pasture.

No. 4. " " pasture and bush.

No. 5. " " under hay of splendid quality, yielded two and a-half tons per acre.

No. 6. " " hay crop yielded two tons per acre.

No. 7. " " " " " " " "

No. 8. " " " " " two and three-quarter tons per acre.

No. 9. " " pasture.

No. 10. " " fifteen acres of which are summer-fallowed and sown with wheat. The balance is under small fruit.

No. 11.—Twenty-three acres, sown with oats (Black Tartarian), was broken down by rain storms, and yielded forty bushels per acre.

No. 12.—Fifteen acres, pasture.

No. 13.—Twenty acres, sixteen acres sown with peas, yielded twenty-five bushels

per acre, the remaining four acres of which are at the disposal of the students as recreation grounds, meantime.

No. 14.—Twenty-five acres, experimental field.

No. 15.—Twenty acres, hay crop, yielded two and three-quarter tons per acre.

No. 16.—Twenty-five acres, twenty of which were sown with fall wheat (Clawson), yielded fifteen bushels per acre, five remaining were stumped, cleared from stone, ploughed and sown with peas, yielded eighteen bushels per acre, straw measuring ten and twelve feet in length which explains the deficiency.

No. 17.—In this field seventeen acres were sown with roots, eight acres of which were potatoes. As I already intimated the amount of rain which was baneful in many respects, proved doubly so in regard to the low lands which were completely flooded. Notwithstanding all these drawbacks the crop of potatoes was really excellent, yielding no less than eight hundred bushels, which for quality can favourably compare with any others. Eight acres of mangels and sugar beet yielded 650 bushels per acre, and one acre of carrots (White Belgium), yielded 500 bushels.

No. 18.—Thirteen acres sown with turnips yielded 450 bushels per acre.

No. 19.—Containing thirty acres, sixteen of which were sown with barley, yielded thirty-five bushels per acre, and the remaining fourteen sown with oats, (Black Tartarian) on turnip ground, proved most successful —yielding seventy bushels per acre.

No. 20.—Remains uncultivated, while

No. 21 contains sixteen and a-half acres in pasture.

Thoroughly convinced of your efforts to see this Institution enjoy the distinction its founders desired, and being a daily witness of your labours to render it such, I am persuaded that a brief notice on the special Live Stock class will cause you as much pleasure as it has given satisfaction to myself. The class proper consists of fifteen students, and I am bound to say that for gentlemanly conduct aud deportment, they are first class, and as for the interest they evince in the lectures, it is only equalled by their untiring perseverance and assiduity at class. The many branches in the Live Stock Department furnish them with ample subjects, especially in a practical sense. Nothing is hurriedly gone through. Every subject is carefully handled and analyzed, even the most minute is not set aside until we are assured that the students have mastered and developed it in all its parts.

While under my supervision for the first hour, two are weekly detained in charge of experimental sheep, the remainder are distributed to cattleman, shepherd, and experimental cattle.

My lectures to them may be enumerated under the following heads, which occupy the second hour.

1st.—On the treatment of cattle, sheep, and swine.

2nd.—Judging and handling store and fat cattle.

3rd.—Milking properties of cattle.

While occupied in cutting up the meat for College, I explain the different parts of beef, mutton, and pork, stating the market value of each part of the carcase. This information furnishes the students with much practical knowledge and at the same time points out the places in which the prime parts of the animal are to be found, and judge the value of it when alive.

THE IMPORTATION OF CATTLE, SHEEP, AND SWINE, REQUISITE FOR 1884.

Before submitting the kind and quantity of cattle for your consideration. I would beg to state that the short-horned breed has been very poorly represented on the farm. during my term of office.

The reputation of this breed throughout Europe and America should make us the more anxious to secure a fair representation. I trust the Government will make a sufficiently large appropriation to enable you to import *superior cattle*, not only for the interests of education, but also for the improvement of the stock in Ontario. Above all no second rate cattle should be tolerated on the farm for breeding purposes.

I cheerfully submit the following *superior breeds* and numbers of both sexes, with the estimated amount required to purchase them. In my estimation the sum of thirty five thousand dollars ($35,000) is necessary.

CATTLE.

Shorthorn.
1 Bull ;
5 Females.

Aberdeen Poll.
1 Bull ;
5 Females.

Norfolk or Suffolk Polls.
1 Bull ;
2 Females.

Hereford.
1 Bull ;
5 Females.

Devon.
1 Bull ;
2 Females.

West Highland.
2 Females.

Ayrshire.
1 Bull ;
2 Females.

Holstein.
1 Bull ;
2 Females.

Alderney.
1 Bull ;
2 Females.

Galloway.
1 Bull ;
2 Females.

SHEEP.

Lincoln.
1 Ram ;
5 Ewes.

Leicester.—English.
1 Ram ;
5 Ewes.

Leicester.—Border.
1 Ram ;
5 Ewes.

Cotswold.
1 Ram ;
5 Ewes.

Cheviot.
1 Ram ;
5 Ewes.

Oxford Down.
1 Ram ;
5 Ewes.

South Down.
1 Ram ;
5 Ewes.

Merino.
1 Ram ;
5 Ewes.

Hampshire Down.
1 Ram ;
5 Ewes.

Shropshire Down.
1 Ram ;
5 Ewes.

SWINE.

Berkshire.
1 Boar ;
2 Sows.

Poland China.
1 Boar ;
1 Sows.

Essex.
1 Boar ;
2 Sows.

HORSES.

1 Clyde Stallion.
2 do. Mares.

Remarks.

It seems to me, and I heartily recommend that shafting be fixed in the implement shed for running machinery, for the instruction and benefit of the students as far as the practical management is concerned. There is nothing, I am sure, would or could interest the students more and add a very valuable acquisition to their already well earned stock of information.

To facilitate this, the portable engine now in our possession would answer the purpose excellently, while the placing of the shafting would, after all, be but secondary when we consider the benefit and amount of real solid knowledge to be derived therefrom. This being accomplished the winter months, which in themselves are more or less dreary, would be rendered cheerful, while each and every student would become thoroughly competent in all the intricate workings of farm machinery.

Coupled with this a long shed with close floor would be necessary to instruct the students in hand sowing. In spring the season being so short between ploughing and sowing, and having so many students for instruction, it seems to me impossible (at least beneficially), to impart the amount of instruction necessary for this important branch of education.

Now as the Government is about to erect new buildings, viz. : barn, cattle and horse stables, etc., I trust that nothing may be brought to their notice quicker than the necessity of erecting among the others a building commodious in all its apartments for the instruction of students during the winter term. Moreover, I can afford to give more of my time at this season of the year than at any other.

Another very important matter I would like to call your attention to is, that the students' vacation commences on September 1st, in each year. It is at the beginning of this month, we start our fall ploughing, and by their absence they lose the most beneficial part of the year to reap a rich harvest of useful information in this special branch.

Another remark which may be of interest and which has frequently occurred to me is that while farmers' sons depart for home it would be well to retain those who are not farmers' sons, as they require much more instruction.

I am, sir,

Your obedient Servant,

P. J. Woods,

Farm Foreman.

III.—LIVE STOCK.

1.—Public Sale of Live Stock.

Our Seventh Annual Sale of Live Stock was the largest of the kind, and the most varied of anything from one farm, in European or American experience. As many as two hundred and sixty head of fifteen distinct breeds of cattle, sheep, swine and dogs were sold without any reserve. This was done in view of new importations next year. The sale was held on the grounds and during the exhibition of the Agricultural and Arts Association, at Guelph, which afforded the best time and facilities for the purpose. Of the merits of many of the animals much could be said in commendation. The country, to a large extent, is acquainted with their stamp, and I need therefore but refer to a few.

Among the Shorthorns, *Louan of Guelph* possesses, in addition to a first-class pedigree, a great depth and width of frame, with most of the points of a good milker, for which her family, on the dam's side, has been famous. *Cambridge Queen 2nd*, as a branch of another distinct family, have been most renowned as beefers, and this heifer having made an unusual growth, with many points of beauty for her age, has been put early to breed.

Among Herefords, the cow *Heatherbell* is considered one of the finest in the Province, is still a true breeder, a grand doer, and is dam of some of the prominent stock

bulls of the United States and Canada. Her latest calf, *Heatherbell 5th*, is clearly the best heifer ever sent from this herd. The imported three year old bull *Hopedale* has several times fetched us an offer of $1,000. The evidence of his get in the catalogue, and his own characteristic stamp, will ensure high commendation.

With regard to Aberdeen-Angus Polls, the first cow on the list, *Haughton Lass*—for which we hold handsome private offers—is out of the cow that stood first in an extensive competition at Alford, Aberdeenshire, 1876, beating even Mr. McCombie, of Tillyfour. The heifers *Donside Lass* and *Maid of Meldrum*, are those that have been so much admired by hundreds of visitors during the past summer. The bull *Marquis of Huntly* is an unusually good animal, showing already all the fulness and finish of his kind; his pedigree on the dam's side is one of the best liked in Scotland. *Meldrum* is only three years old, and is certainly the most even of all our herd bulls.

The Devons show their usual sweetness, with the comparatively heavy weight of 2,100 lbs., for the bull *General Wyndham*, which is but four years and very active.

Taken as a whole, the Ayrshires are one of the most regular and true lots to be sold. Few exhibition records are equal to that of *Stoncalsey*—a winner of cups, medals, and 1st prizes in Scotland. We had difficulty in securing *Juno 2nd of Drumlanrig* from the Duke of Buccleugh.

The Jersey cow and bull calf are from England's best blood—the one a direct importation, and the other by a fine bull of Mr. Fuller's, of Hamilton Ontario.

That some of the grade cows meet with much favour is well-known, as for symmetry and markings several are superior to those having full pedigree. The case of lot fifty-three will be readily understood by those who are acquainted with our experimental objects.

Our position as breeders of sheep is perhaps higher than that of cattle. The large and varied lot in the catalogue are all pure bred—either directly imported or from recent importations—systematic bi-annual purchases of stock rams from Britain having been part of the management.

Those who wished subjects for late fall, and for Christmas shows, had room enough among the shearling and two shear fat wethers. Some of the latter took first prizes at the last Chicago Fat Stock Exhibition, and the others are even superior, according to age.

Our exhibit of Swine was very much better than it has been for some years; and while, maybe, some fanciers would like somewhat better "markings," the vigour and form no one will object to. The stock boar *Sterling Value* is well worth the notice of high class breeders.

And our shepherd dogs—Scotch Collies—need no comment, other than that they are of the usual black and tan, shaggy type, true to their pedigree, and maintaining the remarkable intelligence for which the kind is noted.

The sale, by reason of the exhibition, largely, although we have always had over 500, was attended by nearly 2,000 people. We had provided a tent to seat 500, but the crush was so much that adjournment was made to one of the judging rings. Mr. James Taylor, the auctioneer, outdid all expectations, not only in expedition, in gentlemanly conduct, but the power of drawing money where stiffness existed. Through him, as also favourable weather, good animals and a keen demand, the sale was a fine success, we realized $1,600 over my own valuation.

The following is the catalogue and list of purchases and prices realized.

Analysis of Prices.

Cattle—

Average of	Shorthorn	cows	.....	$150
"	"	heifers	.....	118
"	"	bulls (one)	.....	145
"	Hereford	cows	.....	307
"	"	heifers	.....	215
"	"	bulls (one)	.....	210

Average of Aberdeen Angus cows (one)	420
" " " " heifers	405
" " " " bulls (two)	625
" " Devon cows (one)	60
" " " bulls (two)	50
" " Ayrshire cows	76
" " " heifers (one)	42
" " " bulls (four)	79
" " Jersey cows (one)	205
" " " bulls "	102
" " Shorthorn Grade cows	69
" " Aberdeen Poll Grade cows	66
" " Ayrshire Grade cows	53
One fat two-year-old Shorthorn steer	270

Sheep—

Average of Cotswold Rams	$13
" " Leicester "	20
" " Oxford Down Rams	27
" " Shropshire Rams	36
" " Southdown "	18
" " Merino Rams (one)	31
" " Cotswold ewes	13
" " Leicester "	11
" " Oxford Down ewes	29
" " Shropshire ewes	32
" " Southdown "	20
" " fat wethers	14

Swine—

Average of Berkshire boars	$23
" " " sows	13
" " Essex sows (one)	25
" " Poland China boar (one old)	12

Dogs—

Average of Scotch Collies	$12

PUBLIC SALE OF LIVE STOCK, SEPTEMBER 28TH, 1883.

LOT.	CLASS.	PURCHASER, ETC.	AMOUNT.	TOTAL.
	CATTLE (Short Horn).		$ c.	
	COWS AND HEIFERS—			
1	Cow	J. McLaren, Gore of London	150 00	
2	"	Thos. Graham, Ottawa	210 00	
3	"	Jas. Gowand, Dunblane	116 00	
4	"	Wm. Graham, Ottawa	120 00	
5	Heifer	Amos Butter, Coldstream	160 00	
6	"	A. Taylor, Dromore	75 00	
7	"	A. G. White, Pembroke	130 00	
8	"	S. Hogarth, Exeter	105 00	
	Bull	John Tough, Blake	145 00	
				$1,211 00

PUBLIC SALE OF LIVE STOCK, SEPTEMBER 28th, 1883.—*Continued.*

LOT.	CLASS.	PURCHASER, ETC.	AMOUNT.	TOTAL.
			$ c.	
	HEREFORDS—			
10	Cow	L. G. Drew, Oshawa	310 00	
11	"	" "	360 00	
12	"	W. Howitt, Guelph	250 00	
13	Heifer	" "	230 00	
14	"	L. G. Drew, Oshawa	275 00	
15	"	Dr. A. Norris, Spencer, N. Y	140 00	
16	Bull	Oliver Duck, Hannibal, Miss	210 00	
				$1,775 00
	ANGUS OR ABERDEEN POLLS—			
17	Cow	Oliver Duck, Hannibal	420 00	
18	Heifer	Geary Bros., London, Ont	525 00	
19	"	T. W. Harvey, Nebraska	395 00	
20	"	Oliver Duck, Hannibal	205 00	
21	Bull	T. W. Harvey, Nebraska	550 00	
22	"	Oliver Duck, Hannibal	700 00	
				$2,795 00
	DEVONS—			
23	Cow	F. W. Rothera	60 00	
24	Bull	W. Curtis, Darlington	50 00	
25	"	Harry Hawes, Guelph township	50 00	
26	"	" "	191 00	
				$351 00
	AYRSHIRES—			
27	Cow	Thos. Fisher, Creekbank	80 00	
28	"	Bernard McName, Lansdowne	78 00	
29	"	Archibald Cearns, Flesherton	86 00	
30	Heifer	Thos. McRae, Guelph	42 00	
31	Cow	Chas. Howitt, Guelph	65 00	
32	Bull	Thos. Fisher, Creekbank	72 00	
33	"	T. Guy & Son, Oshawa	82 00	
34	"	W. Jiles, Hawick	60 00	
35	"	F. W. Rothera, Simcoe	101 00	
				$666 00
	JERSEYS—			
36	Cow	A. Jeffrey, St. Catharines	205 00	
37	Bull	" "	102 00	
				$307 00
	GRADES (Short Horn)—			
38	Cow	W. West, Guelph	67 00	
39	"	" "	25 00	
40	"	Stewart & Bennett, Orangeville	89 00	
41	"	W. West, Guelph	100 00	
42	"	J. Armstrong, Warkworth	88 00	
43	"	Chas. Howitt, Guelph	95 00	
44	"	" "	81 00	
45	"	" "	92 00	
46	"	R. A. Ramsay, Eden Mills	72 00	
47	"	Mark Langdon, Arthur township	71 00	
48	"	J. Webb, Ospringe	40 00	
49	"	W. West, Guelph	39 00	
50	"	G. Taylor, Rockwood	35 00	
				$894 00
	ABERDEEN POLL GRADE—			
51	Cow	John Nelson, Orillia	50 00	
52	"	T. Evans, Puslinch	83 00	
53	Bull	J. McCorkindale, Paisley Block	80 00	
				$213 00
	AYRSHIRE GRADES—			
54	Cow	J. Rennelson, Galt	64 00	
55	Heifer	Chas. Howitt, Guelph	41 00	
				$105 00
	FAT CATTLE—			
56	The White Duke	Rich. Gibson, London, Ont	270 00	
				$270 00
		Gross total for Cattle		$8,587 00

PUBLIC SALE OF LIVE STOCK, SEPTEMBER 28th, 1883.—*Continued.*

LOT.	CLASS.	PURCHASER, ETC.	AMOUNT.	TOTAL.
	SHEEP.			
	RAMS—		$ c.	
1	Cotswold	W. Argo, Eramosa	30 00	
2	Leicester	D. Johnston, Campbellford	42 00	
3	Oxford Down	J. Sharman, Stratford	45 00	
4	Shropshire	T. Shaw, Hamilton	52 00	
5	Southdown	H. B. Jeffs, Bond Head	46 00	
6	Merino	Geo. Hood, Guelph	31 00	
				$246 00
7	Cotswold	W. C. Smith, New Hamburg	20 00	
8	"			
9	"	T. Manderson, Guelph	14 00	
10	"	D. Linderman, Eramosa	14 00	
11	"	T. C. Stark, Gananoque	31 00	
				$79 00
12	Oxford Down	R. Gowan, Walkerton	23 00	
				$23 00
13	Southdown	Chas. Kay, Fergus	17 00	
14	"	D. McLennan, Glengarry	15 00	
15	"	F. J. Chadwick, Guelph	18 00	
				$50 00
16	Cotswold ram lamb	H. Arkell, Arkell	10 00	
17	" "			
18	" "	W. Barker, Puslinch	8 00	
19	" "	J. Myers, Koworth	10 00	
20	" "	T. Taylor, Hazel	8 00	
21	" "			
22	" "	D. McLennan	8 00	
23	" "	H. Webster, West Garafraxa	9 00	
24	" "			
25	" "	M. Harrison, Shelburne	21 00	
26	" "	W. Ramsay, Eden Mills	5 00	
				$79 00
	OXFORD DOWNS—			
27	Ram lamb			
28	"	W. C. Smith, New Hamburg	20 00	
29	"	F. Penton, Maple Hill	18 00	
				$38 00
	SHROPSHIRE DOWNS—			
30	Ram lamb	W. Smith, Innerkip	28 00	
31	"	S. Whitman, Keppel	27 00	
				$55 00
	SOUTHDOWNS—			
32	Ram lamb	J. Cormack, Rockton	7 00	
33	"	S. Whitman, Keppel	6 00	
34	"	R. Andrew, Palmerston	7 00	
35	"	G. Garbutt, Thistletown	15 00	
36	"			
37	"			
38	"	A. R. Kidd, Warsaw	13 00	
39	"	Dan. McLennan, Glengarry	13 00	
40	"			
				$61 00
	COTSWOLDS—			
41	Ewe lamb	G. Tomson, Elora	9 00	
42	"	" "	9 00	
43	"	W. Argo, Eden Mills	7 00	
44	"	" "	7 00	
45	"	J. W. Oversholt, Marshville	14 00	
46	"	" " "	14 00	
47	"	T. Hume, Seymour	24 00	
				$84 00
	LEICESTERS—			
48	Ewe lamb			
49	"	A. Cearns, Flesherton	21 00	$21 00
50	"			
	OXFORD DOWN—			
51	Ewe lamb			
52	"	D. A. Norris, Spencer, N.Y	60 00	$60 00
53	"			

PUCLIC SALE OF LIVE STOCK, SEPTEMBER 28th, 1883.—*Continued.*

LOT.	CLASS.	PURCHASER, ETC.	AMOUNT.	TOTAL.
			$ c.	$ c.
	SHROPSHIRE—			
54	Ewe lamb	C. Rennie, Hamilton	48 00	48 00
55	"			
56	"			
	SOUTHDOWN—			
57	Ewe lamb	W. Howitt, Guelph	45 00	45 00
58	"			
59	"			
60	"			
	COTSWOLD—			
61	Ewes, pair	J. Martin, Cayuga	22 00	
62	"	T. Waters, Rockwook	18 00	
63	"	W. Rudd, Guelph	24 00	
64	"	J. R. Martin, Cayuga	20 00	
65	"	F. C. Stark, Gananoque	26 00	
66	"	J. W. Overholt, Marshville	28 00	
67	"	J. R. Martin, Cayuga	40 00	
68	"	A. C. Cornell, Harley	24 00	
69	"	F. C. Stark, Gananoque	28 00	
70	"	A. C. Cornell, Harley	20 00	
71	"	G. Taylor, Rockwood	22 00	
72	"	A. C. Cornell, Harley	26 00	
73	"	T. Howie, Summerville	24 00	
74	"	A. C. Cornell, Harley	16 00	
75	"	J. Overholt, Marshville	36 00	
76	"			384 00
	LEICESTER—			
77	Ewes, pair	J. Neilson, Lyn	20 00	
78	"	G. Stewart, Flesherton	26 00	
79	"	M. Gourlay, Mitchell	18 00	
80	"	R. Wightman, Marnock P. O	28 00	
81	"	G. Tomson, Elora	22 00	
82	"	E. V. Thomson, Guelph	20 00	
83	"			
84	"			
85	"	J. R. Martin, Cayuga	33 00	
86	"			167 00
	OXFORD DOWNS—			
87	Ewes, pair	W. C. Smith, N. Hamburg	58 00	
88	"	G. Cassie, Fergus	80 00	
89	"	J. Sharman Stratford	66 00	
90	"	G. Cassie, Fergus	50 00	
91	"	J. Sharman, Stratford	62 00	316 00
	SHROPSHIRE—			
92	Ewes, pair	J. Howe, Kimberly	72 00	
93	"	J. B. Lynder, Waterloo	62 00	
94	"	H. Watson, Guelph	66 00	
95	"	S. Whitman, Keppel	50 00	
96	"	T. Ellis, Kimberly	84 00	
97	"	C. Howitt, Guelph	68 00	
98	"	G. Garbutt, Thistletown	54 00	456 00
	SOUTHDOWN—			
	Ewes, pair			
99	"	S. Whitman, Keppel	36 00	
100	"	W. Howitt, Guelph	30 00	
101	"	J. Cormock, Erin	30 00	
102	"	S. Brown, Dunboyne	32 00	
103	"	J. Martin Cayuga	30 00	
104	"	W. Howitt, Guelph	36 00	
105	"	J. McBeth, Eden Grove	48 00	
106	"		48 00	290 00

PUBLIC SALE OF LIVE STOCK, SEPTEMBER 28th, 1883.—*Continued.*

LOT.	CLASS.	PURCHASER, ETC.	AMOUNT.	TOTAL.
	FAT SHEEP—			
107	Pair Shropshires	Jas. Glennie, Puslinch	34 00	
108	" Oxfords	G. Hood, Guelph	30 00	
109	" "	" "	34 00	
110	" Cotswolds	" "	24 00	
111	" Leicesters	" "	34 00	
112	" "			
113	" Cotswolds			
114	" Oxfords	L. Marks, Kenilworth	24 00	
115	" "	G. Hood, Guelph	24 00	
116	" Shropshires	" "	24 00	
117	" "			
118	" Merino	G. Hood, Guelph	24 00	252 00
	SWINE.			
	BERKSHIRE—			
1	Boar	Eli Gregory, Point Dalhousie	31 00	
2	"	W. C. Smith, New Hamburg	17 00	
3	"	Amos Cutter, Coldstream	20 00	
4	"	T. Day, Cargill	26 00	
5	Sow	M. Langdon, Kenilworth	16 00	
6	"	B. Hewson, Hamilton	11 00	
7	"	W. Dickson Mildmay	18 00	
8	"	J. Segmiller Walkerton	10 00	
9	"	G. Thomson, Guelph	10 00	
10	Boar	John Hewer, Guelph	12 00	
11	"	R. Carrick, Blair Station	20 00	
12	"	K. Montgomery, Kincardine	24 00	
13	"	W. Hull, Erin	30 00	
14	Sow	J. Hewer, Guelph	8 00	
15	Boar	W. Hull, Erin	8 00	
16	"			
17	"			
18	"			
19	Sow			
20	"			
21	Essex Sow	John Hewer, Guelph	25 00	
22	Poland China Boar	J. Hewer, Guelph	12 00	299 00
	DOGS.			
	SCOTCH COLLIE—			
1	Dog	R. Gibson, Delaware	17 00	
2	"	" "	14 00	
3	"	Major Gray, Toronto	14 00	
4	"	H. G. Joyce, O. A. C	8 00	
5	Bitch	E. Bigbie, Guelph	11 00	
6	Dog	E. A. Saxton, O. A. C	9 00	
7	"			
8	"			
9	"	F. Hills, Delaware	8 00	
10	"			
11	Bitch	S. Beaty, Markham	14 00	
12	"	John Hope	13 00	108 00

ABSTRACT.

Cattle	$8,587 00
Sheep	2,754 00
Swine	299 00
Dogs	108 00
Total amount of sale	$11,748 00

As our clearing out sale has been of more than usual interest, I beg to append the pedigree catalogue.

SHORTHORNS.

Cows and Heifers.

Lot 1.—Rosallie 2nd [1582]. (*Ear Label 9.*)

Red and White. Bred at O. E. Farm; calved 23rd October, 1878.

	Got by	Duke of Bedford (36466)	H. M. The Queen.
Rosallie	"	Prince Albert 2nd (29558)	" "
Rosebud	"	Rajah (22670)	" "
Rosabella	"	Goldsmith (10277)	Mr. Torr.
Darling	"	Goldsmith (10277)	" "
Darling	"	Brilliant (8905)	W. D. Manning.

On the male side tracing through Lord Oxford 2nd (20215), Prince Saxe Cobourg (20576), Helmsman (8141) and Hurricane (4061).

In calf to Sir Leonard (45613)—due 17th December, 1883.

Lot. 2.—Louan of Guelph [1603]. (*Ear label 5.*)

Red, bred at O. E. Farm; calved 4th May, 1877.

	Got by	3rd Duke of Springwood [3087], 16926.	
Louan of Brant 5th	"	Knight of St. George [1630], 8472, (26544)	Mr. Carr.
Louan of Brant 2nd	"	Crown Prince of Athelstane [1507], 5487, (21512)	J. Douglas.
Louan 17th	"	Duke of Airdrie, 2473	Major J. Duncan.
Louan 3rd	"	John O'Gaunt (11621)	Mr. J. S. Tanqueray.
Louan 1st	"	Otley (4632)	Mr. Fawkes.
Cambria	"	Bertram 2nd (3144)	Col. Powell.
Virginia 2nd	"	Bertram (1716)	Mr. Whitaker.
Lucilla 2nd	"	Memnon (1223)	Mr. Whitaker.
Virginia	"	General (272)	General Simpson.
Rosemary	"	Flash (261)	Mr. Gibson.
Redrose	"	Petarch (488)	Mr. C. Collings.
Brighteyes	"	Alexander (22)	Mr. C. Collings.
Red Acomb	"	Traveller (655)	Mr. W. Jobbing.
———	"	Son of Bolingbroke (86)	Mr. C. Collings.
———	"	J. Brown's Red Bull (97)	Mr. J. Thompson.

In calf to Sir Leonard (45613), due January 2nd, 1884.

Lot. 3.—Louan of Wellington [1212]. (*Ear label 158.*)

Roan, bred at O. E. Farm; calved February 23rd, 1881,

	Got by	Prince Hopewell [7656]	J. & R. Hunter.
Louan of Brant 5th	"	Knight of St. George [1530], 8472, (26544).	

For remainder of pedigree see Lot 2.

In calf to Sir Leonard (45,613), due January 3rd, 1884.

Lot 4.—Lady Elizabeth [1580]. (Ear label 4.)

Roan, bred at O. E. Farm; calved May 11th, 1876.

Got by Cranberry Chief [2922].....J. S. Armstrong.
Martha ..... " 11th Duke of Thorndale, 5611.
Alabama..... " Clarendon (2632).

In calf to Sir Leonard (45,613), due April 19th, 1884.

Lot 5.—Cambridge Queen 2nd [1211]. (Ear label 173.)

Red, bred at O. E. Farm; calved March 13th, 1882.

Got by Baron Berkeley [968], ,22010, (36158).
Cambridge 10th..... " King of the Ocean [1619], 8465....Mr. Chaloner.
Cambridge 7th ..... " 11th Duke of Thorndale, ,5611.... " S. Thorne.
Cambridge 4th ..... " The Moreton Duke [742]..... " F. W. Stone.
Cambridge 3rd ..... " Grand Duke [332], ,2292, (17993).. " F. W. Stone.
Cherry Pie..... " Lord of the North (11743)..... " Jonas Webb.
Celia ..... " 3rd Duke of Northumberland (3647) " Thos. Bates.
Cornflower ..... " Bashaw (1692) ..... " Bower.
Columbine ..... " Helmsman (2190) ..... " K. Sutton.
Columbia..... " Collumella (904)..... " R. Booth.
Charlottina..... " Regent (544) ..... " R. Collings.
Charlotte Palatine..... " Palatine (478).....Major Bowers.
Charlotte ..... " Palmflower (480) .....Mr. Geo. Coates.
Crimson..... " Patriot (486) ..... " G. Coates.
Young Millbank ..... " Driffield (223)..... " G. Coates.
——— ..... " Mr. C. Holmes' Bull ..... " C. Holmes.

In calf to Sir Leonard (45613), due May 27th, 1884.

Lot 6.—Lady Leonard. (Ear label 203.)

Red, bred at O. E. Farm; calved 20th April, 1883.

Got by Sir Leonard (45613) .....H. Aylmer, Eng.
Lady Elizabeth ..... " Cranberry Chief [2922].....J. S. Armstrong.

For remainder of pedigree see Lot 4.

Sir Leonard is by Sir Wilfrid (37484) out of Countess 3rd by High Sheriff, etc., etc., one of the best lines of the Booth Stock.

Lot 7.—Rosallie 4th. (Ear label 209.)

Red, with white spots, bred at O. E. Farm; calved January 4th, 1883.

Got by Sir Leonard (45613) .....H. Aylmer.
Rosallie 2nd ..... " Duke of Bedford (36466).....H. M. The Queen.

For remainder of pedigree see Lot 1.

Lot 8.—Louan of Galt. (Ear label 211.)

Red, with white spots, bred at O. E. Farm; calved February 7th, 1883.

Got by Sir Leonard (45613) ....H. Aylmer.
Louan of Guelph..... " 3rd Duke of Springwood (3087), ,16926.

For remainder of pedigree see Lot 2.

BULLS.

Lot 9.—O. A. C. [1006]. (Ear label 186.)

Red, with white spots, bred at O. E. Farm ; calved November 19th, 1883.

	Got by	Socrates	H. Aylmer.
Beta	"	Sir Wilfrid (37484)	T. C. Booth.
Beautiful Star	"	Hyperion (34196)	H. Aylmer.
Balmful	"	High Sheriff 26392	T. B. Booth.
Banter	"	Cerdie 19415	J. Peel.
Blithesome	"	Sir James 16980	R. Booth.
Bashful	"	Prince Imperial 15095	S. E. Bolden.
Blissful	"	Grand Duke 10284	T. Bates.
Bridget	"	Baron Warlaby 7813	R. Booth.
Bliss	"	Leonard 4210	R. Booth.
Yg. Broughton	"	Young Matchem 2282	J. Booth.
Broughton	"	Jerry 4097	T. Booth.
———	"	Young Pilot 4702	T. Booth.
———	"	Pilot 496	R. Colling.
———	"	Son of Apollo 36	T. Booth.

Sir Wilfrid is by Royal Benedict, for many years the principal sire at Warlaby, from Lady Fanny by Lord Blithe, own brother to the famous Royal prize cow Lady Fragrant. He is also of Lady Fragrant's family in the direct female line of descent, as well as of that of the celebrated bull King James 28971, sire of many prize winners at the Royal English and Irish Shows.

HEREFORDS.

COWS AND HEIFERS.

Lot 10.—Princess Mary 2nd, Imported. (Ear label 49.)

Calved September 23rd, 1873.

	Got by	Prince George Frederick (4051)	H. M. The Queen.
Princess Mary	"	Ajax (1843)	H.R.H. Pr'ce Consort.
Maude	"	Windsor (1456)	" " "
Superb	"	Carlisle (923)	Earl of Radnor.
Stella	"	Venison 2nd (1442)	Mr. Stedman.

In calf to Hopedale (139) due 24th November, 1883.

Lot 11.—Heatherbell, Imported. (Ear label 50.)

Calved September 25th, 1873.

	Got by	Prince George Frederick (4051)	H. M. The Queen.
Calliope	"	Deception (2491)	James Rea.
Crown Princess	"	Ajax (1843)	H.R.H. Pr'ce Consort.
Juno	"	Maximus (1650)	" " "
Fanciful	"	———	

In calf to Hopedale (139), due October 30th, 1883.

Lot 12.—Princess Louise [24]. (Ear label 48.)

Bred at O. E. Farm ; calved April 23rd, 1878.

Got by Duke of Connaught (4528).....H. M. The Queen.
Princess Mary 2nd..... " Prince George Frederick (4051).... " " "

For remainder of pedigree see Lot 10.

In calf to Hopedale (139), due May 29th, 1884.

Duke of Connaught, imported by the Ontario School of Agriculture in September, 1876, was got by Alexander (3653); dam Sultana by Prince Leopold (3351); grandam Princess Teck by Ajax (1843); g. grandam Lupa by Attingham (911), which was first in his class at Shrewsbury and Carlisle meetings of the Royal Agricultural Society ; g. g. grandam Grey Dahlia 2nd by Walford (871); which was awarded the gold medal as the best stock bull of any age or breed, at the International show at Paris in 1855, besides many first prizes in England.

Prince George Frederick was got by Deception (2491); dam Medea by Brecon (918); grandam Rose by Phantom (1035); g. grandam Rose, bred by the late Viscount Hereford.

Deception was got by Sir Benjamin (1387); dam Nonesuch by Wellington (1112); grandam Fairlass by Chieftain (930); g. grandam Fairmaid 3rd by Cholestry (217); g. g. grandam Fairmaid 2nd by Gallant (239).

Ajax was got by Maximus (1650), winner of the first prize at the Royal Society Show, held at Warwick and Battersea ; dam Zoe by Young Dewshall (1125) ; grandam Prettymaid by a bull bred by the late Mr. Tilly.

Maximus, winner of the first prize at the Royal Society Show at Warwick and Battersea, was got by Brecon (918); dam Superb by Carlisle (923); grandam Stella by Venison (1442); g. grandam Spec by The Duke (550), etc.

Windsor was got by Prince of Wales (1041); dam Zoe by Dewshall (1125); grandam Prettymaid, bred by Mr. Maybery's Brecon.

Carlisle was winner of the first prize in his class at the Carlisle Meeting of the Royal Agricultural Show ; also first at the Bath and West of England Show, at Cardiff. He was got by Vension (1442); dam Clara by the Duke (493), which was winner of the first prize at the Royal Society's Show in 1846.

Lot 13.—Princess Mary 4th. (Ear label 219.)

Bred at O. E. Farm ; calved 7th January, 1883.

Got by Hopedale [139].....W. Horton.
Princess Mary 2nd..... " Prince George Frederick (4051)....H. M. The Queen.

For remainder of pedigree see Lot 10.

Lot 14.—Heatherbell 5th [142]. (Ear label 185.)

Bred at O. E. Farm ; calved October 18th, 1882.

Got by Hopedale [139] .....W. Horton.
Heatherbell (imported).. " Prince George Frederick (4051) ...H. M. The Queen.

For remainder of pedigree see Lot 11.

Lot 15.—Little Lady [143]. (Ear label 190.)

Bred at O. E. Farm ; calved October 25th, 1882.

Got by Hopedale [139] .....W. Horton.
Princess Louise ..... " Duke of Connaught [138], (4528).

For remainder of pedigree see Lot 12.

BULLS.

Lot 16.—Hopedale [139], Imported.

Calved March 26th, 1880; bred by W. Horton, England.

Got by Nero (5477).
Miss Alice 2nd ..... " Hildebrand (4646).
Miss Alice ..... " Sir Roger (4990).
——— ..... " Maximilian (3252).
——— ..... " Jersey (976).
——— ..... " Son of Young Ben (3609).
——— ..... " Young Royal (1469).

To be sold subject to time of delivery. Weight, 2,020 pounds.

ABERDEEN ANGUS POLLS.

COWS AND HEIFERS.

Lot 17—Haughton Lass. (Ear label 36.)

Bred at O. E. Farm; calved August 27th, 1878.

Got by Gladiolus (1161) ..... Earl of Fife.
Leochell Lass 4th (1864). " Hero of Boghead (417) ..... R. C. Farquharson.
Leochell Lass 3rd (1863). " Aberdeen Bull ..... C. McCombie.
Leochell Lass 2nd (1861). " Garribaldi of Haughton (707).

Leochell Lass 4th gained first prize at Alford in 1876, beating Mr. McCombie, of Tillyfour, and other famous breeders. In calf to Meldrum (1759), (imported), due June 13th, 1884.

Lot 18.—Donside Lass. (Ear label 210.)

Bred at O. E. Farm; calved April 18th, 1882.

Got by Gladiolus (1161) ..... Earl of Fife.
Leochell Lass 4th (1864). " Hero of Boghead (417) ..... R. C. Farquharson.

For remainder of pedigree see Lot 17.

Lot 19.—Maid of Meldrum. (Ear label 212.)

Bred at O. E. Farm; calved June 19th, 1882.

Got by Meldrum (1759) ..... Marquis of Huntly.
Haughton Lass ..... " Gladiolus (1161) ..... Earl of Fife.

For remainder of pedigree see Lot 17.

Lot 20.—Speyside Lass. (Ear label 204.)

Bred at O. E. Farm; calved May 21st, 1883.

Got by Meldrum (1759) ..... Marquis of Huntly.
Haughton Lass ..... " Gladiolus (1161) ..... Earl of Fife.

For remainder of pedigree see Lot 17.

BULLS.

Lot 21.—Marquis of Huntly. (*Ear label 189.*)

Bred at O. E. Farm; calved November 7th, 1882.

Got by Meldrum (1759) ..... Marquis of Huntly.
Sybill's Darling 2nd (4611) " Etonian (1658).
Sybill's Darling (4050) .. " Ballot (634).
Freds' 5th Darling (2363) " Scotland (725).
Freds' 2nd Darling (1045) " Reform (403).
Sybill (974) ..... " Black Prince of Bogfern (501).
Ann of Bogfern (539) ... " Banks of Dee (12).
Young Matilda (177).

One of the families held in highest esteem in Scotland.

Lot 22.—Meldrum (1759)—(Imported).

Bred by the Marquis of Huntly; calved April 25th, 1880.

Got by Warrior (1291).
Madge (1217) ..... " Major of Tillyfour (509).
Ruth of Tillyfour (1169). " Black Prince of Tillyfour (366).
Beauty of Tillyfour 2nd (1180)..... " Young Jock (4).
Favourite (2)..... " Grey Breasted Jock (2).

To be sold subject to time of delivery. Weight, 1,910 pounds.

DEVONS.

Cows.

Lot 23.—Nellie (Imported), [872].

Calved October 1st, 1874.

Got by Napier (888) ..... H. M. The Queen.
Violet 2nd ..... " Saracen (520*a*) ..... " "
Snowdrop ..... " Zouave (556) .....
Young Curley.

In calf to General Wyndham [802], due

BULLS.

Lot 24.—2nd General Wyndham. (*Ear label 201.*)

Bred at the O. E. Farm; calved April 19th, 1883.

Got by General Wyndham (802) ..... J. R. Rudd.
Nellie ..... " Napier (888) ..... H. M. The Queen.

For remainder of pedigree see Lot 23.

Lot 25.—3rd General Wyndham. (*Ear label 202.*)

Bred at O. E. Farm; twin with Lot 24, calved April 19th, 1883.

Got by General Wyndham (802) .....J. R. Rudd.
Nellie ..... " Napier (888) .....H. M. The Queen.

For remainder of pedigree see Lot 23.

Lot 26.—General Wyndham (802).

Bred by J. R. Rudd, Guelph; calved March 10th, 1879.

Got by Hartland [363].
Curley 2nd [577] ..... " Young Curley.
Curley [342] ..... " Samson 6th [310].
Daisy [11] ..... " Prince Albert [109].

To be sold subject to time of delivery. Weight, 2,100 pounds.

AYRSHIRES.

Cows and Heifers.

Lot 27.—Beauty of Drumlanrig (*Imported*).

Bred by the Duke of Buccleugh; calved April 10th, 1872.

Got by Burnhouse .....Duke of Buccleugh.
Grey Bess ..... " ——— .....

In calf to Stoncalsey (309), imported, due 22nd August, 1883. Beauty of Drumlanrig was fifth among forty cows in the Glasgow Derby of 1875.

Lot 28.—Flora 3rd of Drumlanrig (*Imported*).

Bred by the Duke of Buccleugh; calved 8th March, 1873.

Got by Blood .....Duke of Buccleugh.
Flora ..... " ——— ..... " "

Flora 3rd gained second prize at Kilmarnock, and was fifth in the Glasgow Derby of 1876. In calf to Stoncalsey (309), due January 20th, 1884.

Lot 29.—Juno 2nd of Drumlanrig (*Imported*).

Bred by the Duke of Buccleugh; calved May 1st, 1874.

Got by Castleburn .....Duke of Buccleugh.
Juno 1st ..... " "

Juno 1st was first at the Highland Society's Show at Glasgow in 1874. In calf to Stoncalsey (309), due January 26th, 1884.

Lot 30.—Beauty of Elora.

Bred at O. E. Farm; calved July 14th, 1882.

Got by Stoncalsey (309).
Beauty of Drumlanrig ... " Burnhouse .....Duke of Buccleugh.
Grey Bess ..... " ——— .....

Lot 31.—Flora of Guelph.

Bred at O. E. Farm; calved May 14th, 1878.

Got by Sir Walter ..... Duke of Buccleugh.
Flora 3rd of Drumlanrig. " ——— ..... " "

In calf to Stoncalsey (309), due March 20th, 1884.

BULLS.

Lot 32.—Stoncalsey 2nd.

Bred at O. E. Farm; calved July 16th, 1882.

Got by Stoncalsey (309).
Flora of Guelph..... " Sir Walter ..... Duke of Buccleugh.
Flora 3rd of Drumlanrig. " Blood ..... " "
Flora ..... " ———

Lot 33.—Stoncalsey 3rd.

Bred at O. E. Farm; calved December 19th, 1882.

Got by Stoncalsey (309).
Juno 2nd of Drumlanrig. " Castleburn ..... Duke of Buccleugh.
Juno ..... " ———

Lot 34.—Stoncalsey 4th.

Bred at O. E. Farm; calved December 23rd, 1882.

Got by Stoncalsey (309).
Flora 3rd of Drumlanrig. " Blood ..... Duke of Buccleugh.
Flora ..... " ———

Lot 35.—Stoncalsey (309), [1435]—(Imported).

Bred by A. Paton, Ayrshire; calved May 20th, 1879.

Got by Black Jock 2nd (122).
Rosie ..... " Prince Charlie.

Weight 1,820 pounds.

This bull gained first prize at Symington, Ayrshire; second at Maryhill, Glasgow; first at Hamilton; first at Lanark, and medal for best bull of any age; first at Biggar, and cup for best animal of Aryshire breed.

JERSEYS.

Cows.

Lot 36.—Princess Alexandria (Imported).

Bred by S. B. Booth, Rochester, England; calved June 10th, 1879.
Got by Kisber (262) ..... W. Amy, England.
Favourite..... " ——— ..... P. de Fenore, Jersey.

In calf to Thalma, due

BULLS.

Lot 37.—3rd Prince Boulivot.

Bred at the O. E. Farm; calved March 15th, 1883.

	Got by	Oakland Rex 6839	A. I. C. C.
Princess Alexandria	"	Kisber (262)	W. Amy, England.
Favourite	"	———	———

Prince Boulivot, a whole colour bull, won second prize at the Essex Show at Manningtree, Jersey, in 1880; Kisber won third in the parochial prize at the Royal Jersey Agricultural Society's Show in 1878. Princess Alexandra won first at the Provincial Exhibition, Ontario, in 1881.

GRADE CATTLE.

COWS AND HEIFERS.—SHORTHORN GRADES.

Lot 38.—Blythe.

Aged Cow, in calf to Hereford, due December 29th, 1883.

Lot 39.—Jennie.

Aged Cow, in calf to West Highland Bull; due March 28th, 1884.

Lot 40.—Phin.

Aged Cow, in calf to Hereford or Aberdeen Poll: due November 4th, 1883.

Lot 41.—Model Grade.

Seven year old Cow, in calf to , due .

Lot 42.—Slappertongue.

Aged Cow, in calf to Hereford Bull; due March 16th, 1884.

Lot 43.—Rose.

Seven year old Cow, in calf to Aberdeen Poll; due September 30th, 1883.

Lot 44.—Taylor.

Five year old Cow, in calf to , due January 1st, 1884.

Lot 45.—Cherry.

Heifer, in calf to S. H. Sir Leonard; due February 11th, 1884.

Lot 46.—Lily.

Heifer, in calf to Sir Leonard; due January 3rd, 1884.

Lot 47.—Spotty.

Heifer, in calf to Sir Leonard; due March 16th, 1884.

Lot 48.—Woodbine.

Common Cow, aged, in calf to Hereford Bull Hopedale; due March 12th, 1884.

Lot 49.—Strawberry.

Common Cow, aged, in calf to .

Lot 50.—Simmy.

Common Cow, aged, in calf to Shorthorn; due May 22nd, 1884.

ABERDEEN ANGUS POLL GRADES.

Lot 51.—Brownie—five years old.

Ear label 123; out of high grade Shorthorn, by Aberdeen Angus Poll bull Gladiolus (1161); in calf to ; due

Lot 52.—Aberlour Lass.

Ear label 194; calved June 20th, 1882, out of Brownie; Lot 51 herewith, by Aberdeen Angus Poll bull Meldrum (1759).

This is a second cross of remarkable beauty.

Lot 53.—Experimental—(Bull).

Bull; ear label 205; calved April 26th, 1883, out of Brownie; Lot 51 herewith, by Aberdeen Angus Poll bull Meldrum (1759).

This second cross is offered for sale as an experiment, and the Government reserve power to withdraw it.

AYRSHIRE GRADES.

Lot 54.—Taylor.

Aged Cow, in calf to Ayrshire bull; due September 17th, 1883.

Lot 55.—Tom.

Heifer; ear label 170; in calf to Ayrshire bull Stoncalsey; due March 28th, 1884.

FAT CATTLE.

Lot 56.—The White Duke.

A pure bred Shorthorn Steer; white; calved May 6th, 1881; weight August 1st, 1,860 pounds.

SHEEP.

Rams.

Lot 1. Three shear Cotswold, "Aylmer, 1881;" imported from H. Aylmer, of Norfolk, England; weight, 370 pounds; clip, unwashed, 18 pounds.

Lot 2. Three shear Border Leicester, "K. W., 1881;" imported by Mr. Kelly, of Dumfries, Ontario; weight, pounds; clip, 14½ pounds.

Lot 3. Three shear Oxford Down, "Treadwell, 1881;" imported from J. Treadwell, Upper Winchester, Aylesbury, England; weight, 360 pounds; clip, 18 pounds.

Lot 4. Three shear Shrops, "Zetland, 1881;" imported from the Earl of Zetland, Scotland; weight, 255 pounds; clip, 12 pounds.

Lot 5 Three shear Southdown, "Colman, 1881;" imported from Mr. Colman, Norwich, England; weight, 245 pounds; clip, 12 pounds.

Lot 6. Aged Merino, "Ramboulet;" imported from the Royal Farm in France; weight, 240 pounds; average clip, unwashed, 18 pounds.

Shearling Rams.

Lot 7. Cotswold; ear number 544; out of Tombs' ewe by "Arkell" ram.

Lot 8. Cotswold; ear number 564; out of Tombs' ewe by Gillett's "Kilkenny Champion."

Lot 9.	Cotswold;	ear number	558;	out of Cole ewe by Gillett's Kilkenny Champion."
" 10	"	"	584	" " " "
" 11	"	"	775	" " " "
" 12.	Oxford Down	"	807;	out of Brassy ewe by "Treadwell, 1881."
" 13.	Southdown	"	606	" O. E. F. ewe by "Coleman, 1881."
" 14	"	"	616	" " " "
" 15	"	"	622	" " " "

Cotswold—Ram Lambs.

Lot 16.	Ear No.	540.	Dam No.	187.	Sire, Gillett's	"Kilkenny Champion."
" 17	"	257	"	505	"	" "
" 18	"	261	"	223	"	" "
" 19	"	521	"	373	"	" "
" 20	"	522	"	438	"	" "
" 21	"	523	"	571	"	" "
" 22	"	526	"	189	"	" "
" 23	"	527	"	570	"	" "
" 24	"	529	"	199	"	" "
" 25	"	531	"	513	"	" "
" 26	"	535	"	505	"	" "

Oxford Downs—Ram Lambs.

Lot 27.	Ear No.	541.	Dam No.	556.	Sire,	"Treadwell, 1881."
" 28	"	542	"	552	"	"
" 29	"	263	"		"	"

Shropshire Downs—Ram Lambs.

Lot 30.	Ear No.	251.	Dam No.	347.	Sire,	"Zetland, 1881."
" 31	"	259	"	96	"	"

SOUTHDOWNS—RAM LAMBS.

Lot 32.	Ear No.	264.	Dam No.		Sire,	"Coleman, 1881."
" 33	"	545	"	413	"	"
" 34	"	546	"	345	"	"
" 35	"	547	"	429	"	"
" 36	"	256	"	414	"	"
" 37	"	258	"	407	"	"
" 38	"	524	"	415	"	"
" 39	"	536	"	492	"	"
" 40	"	537	"	417	"	"

COTSWOLD—EWE LAMBS.

Lot 41.	Ear No.	528.	Dam No.	146.	Sire,	Gillett's	"Kilkenny Champion."
" 42	"	533	"	143	"	"	"
" 43	"	538	"	139	"	"	"
" 44	"	539	"	159	"	"	"
" 45	"	543	"	550	"	"	"
" 46	"	254	"	119	"	"	"
" 47	"	255	"	121	"	"	"

LEICESTER—EWE LAMBS.

Lot 48.	Ear No.	350.	Dam No.	386.	Sire,	"K. W., 1881."
" 49	"	525	"	314	"	"
" 50	"	530	"	737	"	"

OXFORD DOWN—EWE LAMBS.

Lot 51.	Ear No.	534.	Dam No.	553.	Sire,	"Treadwell, 1881."
" 52	"	544	"	554	"	"
" 53	"	548	"	561	"	"

SHROPSHIRE—EWE LAMBS.

Lot 54.	Ear No.	549.	Dam No.	605.	Sire,	"Zetland, 1881."
" 55	"	550	"	602	"	"
" 56	"	260	"	301	"	"

SOUTHDOWN—EWE LAMBS.

Lot 57.	Ear No.	532.	Dam No.	401.	Sire,	"Coleman, 1881."
" 58	"	252	"	404	"	"
" 59	"	253	"	430	"	"
" 60	"	262	"		"	"

COTSWOLDS—EWES.

Lot 61. Pair, Nos. 228, 119, three shear and aged, out of Lane ewes by Tombs' "Duke."

Lot 62. Pair, Nos. 438, 550, three shear, out of Lane ewes by Tombs' "Duke."
" 63 " 159, 187, aged, out of Tombs' ewes by "Lane, 1877."
" 64 " 505, 571, three shear, out of Lane ewes, by Tombs' "Duke."
" 65 " 143, 504, four shear, out of Lane ewes by Tombs' "Duke."
" 66 " 6, 191, aged, out of Tombs' ewes by "Lane, 1877."
" 67 " 561, 591, shearlings, out of Lane ewes by Gillett's "Kilkenny Champion."

Lot 68. Pair, Nos. 141, 436, four shear and aged, out of Cole ewes by "Lane, 1877."

Lot 69. Pair. Nos. 121, 148, three and four shear, out of Lane ewes by Tombs' "Duke."

Lot 70. Pair, Nos. 189, 223, three shear and aged, out of Tombs' ewes by "Duke."

Lot 71. Pair, Nos. 573, 150, shearling and aged, out of Lane ewes by Gillett's "Kilkenny Champion" and "Lane, 1877."

Lot 72. Pair, Nos. 193, 139, three and four shear, out of Tombs' ewes by "Duke."

Lot 73. Pair, Nos. 741, 570, shearling and three shear, out of O. E. F. ewes by "Sorby" and "Duke."

Lot 74. Nos. 127, 146, four shear and aged, out of Tombs' ewes by "Lane, 1877."

Lot 75. Pair, Nos. 592, 513, shearling and two shear, out of Tombs' ewes by Gillett's "Kilkenny Champion."

Lot 76. Pair, Nos. 600, 506, shearling and two shear, out of O. E. F. and Tombs' ewes by Gillett's "Kilkenny Champion."

LEICESTER—EWES.

Lot 77. Pair, Nos. 66, 781, three shear, out of Waldie ewes by "Bosanquit, 1881.

Lot 78. Pair, Nos. 360, 383, three shear, out of Bow Park ewes by "Bosanquit, 1881."

Lot 79. Pair, Nos. 318, 311, aged, out of Kinnochtry ewes by "Kinnochtry, 1876.

Lot 80. Pair, Nos. 196, 327, three shear, out of Whitelaw ewes by "Bosanquit, 1881."

Lot 81. Pair, Nos. 386, 320, three shear and aged, out of Kinnochtry ewes by "Bosanquit, 1881."

Lot 82. Pair, Nos. 658, 737, shearling and three shear, out of O. E. F. ewes by "K. W., 1881," and "Bosanquit, 1881."

Lot 83. Pair, Nos. 331, 793, aged, out of Whitelaw ewes by "Kinnochtry, 1876."

Lot 84. Pair, Nos. 786, 369, shearling and four shear, out of O. E. F. ewes by "K. W., 1881," and "Tweedie, 1880."

Lot 85. Pair, Nos. 46, 441, out of O. E. F. ewes by "K. W., 1881."

Lot 86. Pair (Leicester and Cotswold), Nos. 314, 573, aged and shearling, "Kinnochtry, 1876," and "K. W., 1881," breeding.

OXFORD DOWN—EWES.

Lot 87. Pair, Nos. 553, 556, three shear, out of O. E. F. ewes by "Brassy, 1876."

Lot 88. Pair, Nos. 808, 512, shearling and two shear, out of O. E. F. ewes by "Treadwell, 1881."

Lot 89. Pair, Nos. 554, 561, four shear and aged, out of Brassy ewes by "Brassy, 1876."

Lot 90. Pair, Nos. 805, 739, shearling and three shear, out of O. E. F. ewes by "Treadwell, 1881," and "Brassy, 1879."

Lot 91. Pair, Nos. 562, 552, three shear and aged, out of Brassy ewes by "Brassy, 1879."

SHROPS—EWES.

Lot 92. Pair, Nos. 96, 603, aged, out of Nocks ewes by "Nocks, 1880."

Lot 93. Pair, Nos. 347, 605, aged, out of Nocks ewes by "Nocks, 1880."

Lot 94. Pair, Nos. 99, 756, three shear, out of O. E. F. ewes by "Nocks, 1880."

Lot 95. Pair, Nos. 764, 602, two shear and aged, out of O. E. F. and Nocks ewes by "Nocks, 1880."

Lot 96. Pair, Nos. 301, three shear, out of O. E. F. ewes by "Nocks, 1880."

Lot 97. (Shrops and Oxford), Nos. 811, 98, shearling and three shear, from "Nocks and Brassy blood."

SOUTHDOWN—EWES.

Lot 98. Pair, Nos. 415, 429, four shear, by "26 Throckmorton," and by "Walsingham 29."
Lot 99. Pair, Nos. 407, 409, aged, by "26 Throckmorton."
Lot 100. Pair, Nos. 401, 414, " " "
Lot 101. Pair, Nos. 345, 413, " " "
Lot 102. Pair, Nos. 404, 780, " " "
Lot 103. Pair, Nos. 418, 707, two and three shear, by "26 Throckmorton."
Lot 104. Pair, Nos. 417, 430, aged, by "26 Throckmorton" and "Walsingham 29."
Lot 105. Pair, Nos. 626, 800, shearlings, by " " " "
Lot 106. Pair, Nos. 432, 492, three shear, out of "Walsingham 29."

FAT SHEEP.

TWO SHEAR GRADE WETHERS.

Lot 107. Pair Shrops, Nos. 700, 750; average weight, 278 pounds.
Lot 108. Pair Oxfords, Nos. 698, 699; average weight, 266 pounds.
Lot 109. Pair Oxfords, ewes, Nos. 444, 563; average weight, 254 pounds.
Lot 110. Pair Cotswolds, one shearling, Nos. 693, 872; average weight, 252 pounds.
Lot 111. Pair Leicesters, Nos. 447, 692; average weight, 310 pounds.

SHEARLING GRADE WETHERS.

Lot 112. Pair Leicesters, Nos. 694, 695; average weight, 230 pounds.
Lot 113. Pair Cotswolds and Southdowns, Nos. 442, 746; average weight, 160 pounds.
Lot 114. Pair Oxfords, Nos. 788, 790; average weight, 193 pounds.
Lot 115. Pair Oxfords, Nos. 696, 799; average weight, 185 pounds.
Lot 116. Pair Shrops, Nos. 697, 772; average weight, 180 pounds.
Lot 117. Pair Shrops and Merino, Nos. 777, 871; average weight, 155 pounds.
Lot 118. Pair Merino, one two shear, Nos. 765, 783; average weight, 180 pounds.

SWINE.

BERKS.

Lots 1, 2, 3 and 4—Boar Pigs.

Farrowed May 2nd, 1883.

Got by (imported) "Sterling Value," 4691. Dam, "Guelph Lass, 8536."

Lots 5, 6, 7, 8 and 9—Sow Pigs.

Farrowed May 2nd, 1883.

Got by (imported) "Sterling Value." Dam, "Guelph Lass, 8536."

Lots 10, 11, 12 and 13—Boar Pigs.

Farrowed May 28th, 1883.

Got by "Sterling Value." Dam, "Lady Thompson, 8540."

Lots 14 and 15—Sow Pigs.

Farrowed May 28th, 1883.

Got by "Sterling Value." Dam, "Lady Thompson, 8540."

"Sterling Value," 4691, was bred by Walter Stewart, Gloucester, England, and imported by Snell Sons, of Brampton. He holds a fine pedigree, and took first prize at London in 1882, and second at Toronto Industrial in 1882.

Lots 16, 17 and 18—Boar Pigs.

Farrowed July 20th, 1883.

Got by (imported) "Sterling Value," dam, "Lady Derby, 8112;" sire, "Prodigal, 3835," dam, "Lady Kingscote, 8032;" sire, "Hornet, 3883," dam, "Wanwort;" sire, "Wootton," dam, "Miss Burnett."

Lots 19 and 20—Sow Pigs.

Farrowed July 20th, 1883.

(Same pedigree as Lots 16 and 18).

Lot 21.—Essex Sow "Sweet 17."

Farrowed September 4th, 1881.

Sire, "Black Prince," dam, "Mayflower;" sire, "Essex Prince," dam, "Queen of Clubs;" sire, "Zulu King," dam, "Black Empress:" sire, "Essex King."

Lot 22.—Poland China Boar.

Farrowed September, 1878.

Got by "Perfection Bruce, 305."
Dam "Lady Morton's Pugh" ..... " "Zebede, 312."
" "Young Bess" ..... " ———

SCOTCH COLLIE DOGS.

Littered April 22nd, 1883. Dam "Luna," Sire "Bob."

Dogs.

Lot 1. "Laddie," black and tan, with white on chest.
Lot 2. "Jumbo," black and tan, with white on chest.
Lot 3. "Tweed," black and tan, with white on chest.
Lot 4. "Yarrow," black, with white on face, legs, chest and tail.

Bitch.

Lot 5. "Lassie," black, with white spots, and tail tip.

Littered April 27th, 1883. Dam "Lark," Sire "Bob."

Dogs.

Lot 6. "Esk," black and tan, with white neck ring and tail tip.
Lot 7. "Speed," black and tan, with white toes.
Lot 8. "Spey," black and tan, with white chest.
Lot 9. "Don," black and tan, with white chest.
Lot 10. "Minto," black and tan, with white chest.

Bitches.

Lot 11. "Snip," black and tan, with white chest.
Lot 12. "Grip," black and tan, with white chest.

Note.—Pedigree will be given with each. They are all from directly imported blood, and prize takers in Britain and Canada.

2.—Ontario Agricultural College Exhibits at Fairs.

We made the following exhibits at Toronto, Guelph, and Hamilton during the month of September:—

Farm Crops of 1883 in Sheaf.

Twelve varieties of winter wheat.
Six varieties of spring wheat.
Thirty-two varieties of oats.
Nine varieties of barley.
Six varieties of green fodder.
Seven varieties of grasses.
Seven varieties of clover.

From Manure Experiments, 1883, in Sheaf.

No. 1. Wheat from nitric acid.
" 2. " " ammonia.
" 3. " " organic nitrogen.
" 4. " " tri-calcic phosphate.
" 5. " " bi-calcic phosphate.
" 6. " " mono-calcic phosphate.
" 7. " " dried blood, sul. ammonia and nitrate of soda.
" 8. " " mineral superphosphate.
" 9. " " muriate of potash.
" 10. " " nitrate of soda.
" 11. " " nitrate of soda and superphosphate.
" 12. " " nitrate of soda and muriate of potash.
" 13. " " muriate of potash and superphosphate.
" 14. " " superphosphate, muriate potash and dried blood—$\frac{1}{3}$.
" 15. " " " " " " " —$\frac{2}{3}$.
" 16. " " " " " " " —full.
" 17. " " farm yard manure.
" 18. " " without manure.

Cattle.

Durham bull (Booth)	3	years,	9	months;	weight,	2150	pounds.
Aberdeen Angus poll bull	3	"	5	"	"	1910	"
Hereford bull	3	"	6	"	"	2020	"
Devon bull	4	"	7	"	"	2100	"
Ayrshire bull	4	"	4	"	"	1850	"
Jersey bull calf			6	"	"		

West Highland bull	1	"	6	"	"	900	"
Durham cow (Booth)	4	"			"	1390	"
Aberdeen Angus poll cow	3	"	6	"	"	1400	"
Hereford cow	10	"			"	1620	"
Devon cow	9	"			"	1080	"
Ayrshire cow	9	"	6	"	"	1110	"
Jersey cow	4	"	3	"	"	700	"
Durham grade cow	7	"			"	1650	"
Aberdeen Angus poll grade heifer, second cross	1	"	3	"	"	900	"

Fattening Cattle.

Durham, pure bred steer, two years, four months ; weight 2005 pounds.

Aberdeen Angus poll grade steers, first crosses, three head, averaging one year, two months ; average weight 1030 pounds.

Hereford grade steers, first crosses, three head, averaging 1 year, 1 month ; average weight 960 pounds.

Daily Food of Young Fattening Cattle.

Green fodder	40 pounds.
Peas	4 "
Oats	8 "
Oil cake	1 "
Bran	1 "

Daily Food of Bulls.

Green fodder or hay	25 or 10 pounds.
Oats	2½ pounds.
Peas	1 "
Oil cake	2 "

The cows are off grass.

Sheep.

Cotswold ram, three shear, and aged ewe	weight	370	and	250	pounds.
Leicester ram and three shear ewe	"		"	230	"
Oxford down ram, three shear, and three shear ewe	"	360	"	230	"
Shropshire down ram, three shear, and four shear ewe	"	255	"	215	"
South down ram, three shear, and three shear ewe	"	246	"	165	"
Merino ram, aged, and shearling ewe	"	240	"	90	"

Ewes off grass without grain.

Fattening Sheep.

Cotswold grades, first crosses, shearling and two shear wethers	weight	220	and	235	pounds.
Leicester grades " " " "		200	"	275	"
Oxford down grades, " " " "		170	"	265	"
Shropshire down grades, " " " "		195	"	285	"
Merino grades, " " " "		165	"	165	"

Food Daily of Fattening Sheep.

Ten pounds of green fodder or four pounds of hay.
One pound of peas.
One pound of oats.
One-quarter pound of bran.

Shearing Wool.

Lamb, Shropshire grade, shorn 12th July, weight of fleece three pounds.

Shearling, Shropshire grade, shorn 1st April, and 12th July this year, first clip eight pounds, second clip four pounds.

Wool in Fleece from Twelve Distinct Classes of Shearlings.

Weight and present value unwashed.

Merino grade, first cross	10	pounds	$2 70
Shropshire grade, first cross	12	"	2 08
Leicester grade, first cross	14	"	1 71
Cotswold grade, first cross	14	"	1 71
South down grade, first cross	9	"	1 60
Oxford down grade, first cross	13	"	1 56
Merino pure bred	9½	"	2 66
Cotswold, pure bred	15¾	"	2 05
Shropshire, pure bred	9	"	1 98
South down, pure bred	6¾	"	1 48
Leicester, pure bred	11¾	"	1 46
Oxford down, pure bred	11¾	"	1 46

The cross is made with a common Canadian ewe.

A Black Diamond.

Sybill's Darling 2nd (4611), bred by James Argo, of Cairdseat, Aberdeenshire, Scotland—the property of the Ontario Experimental Farm.

Calved March 27th, 1880. Sire, Etonian (1658).

Dam, Sybill's Darling, 4050, by Ballot (634).

" Fred's 5th Darling, 2363, by Scotland (725).

" Fred's 2nd Darling, 1045, by Reform (408).

" Sybil, 974, by Black Prince of Bogfern (501).

" Ann of Bogfern, 539, by Banks o' Dee (12).

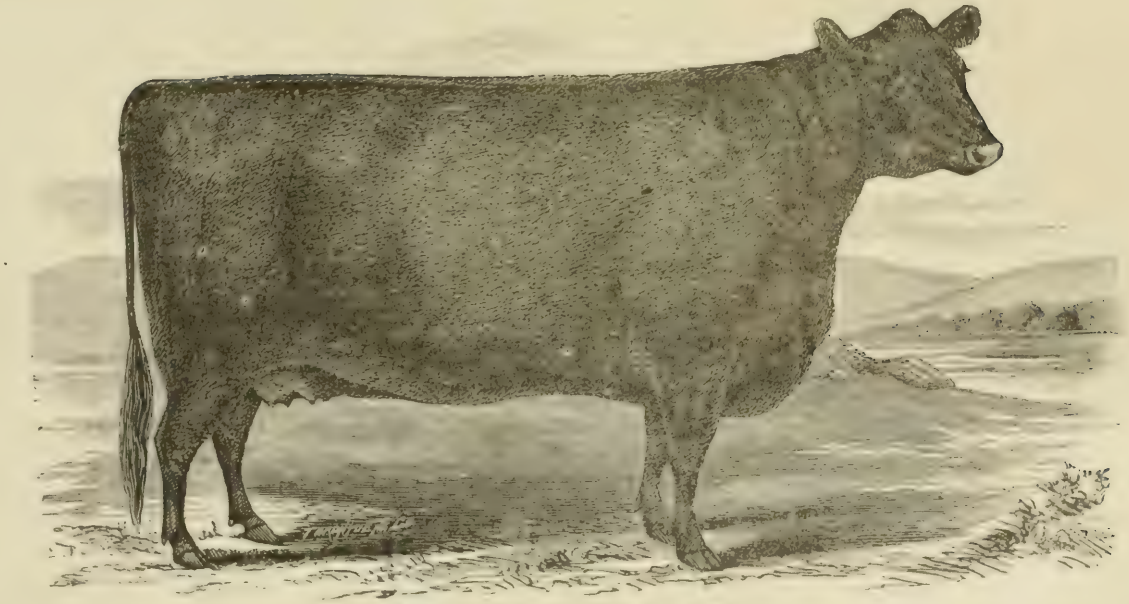
" Young Matilda, 177.

This young Aberdeen Angus poll cow, as selected for us by Mr. Hunter, of Alma, has already made her mark in breeding records,—her first calf, a bull, "Marquis of Huntly," by "Meldrum" (1759), brought $550 when ten months old, at our public sale in September last. She is an unusually even animal, with all the build of a model beefer—on the small side though—and so we were tempted with an offer of $2,000 for her, last year. Cost, delivered at Guelph from Scotland, was $373. But with all my respect for beefers, I think no cow is a cow unless she can raise her own calf. Now, neither this cow, nor the $1400 shorthorn imported at the same time can milk their own calves as they should be done. We cannot maintain beef without milk.

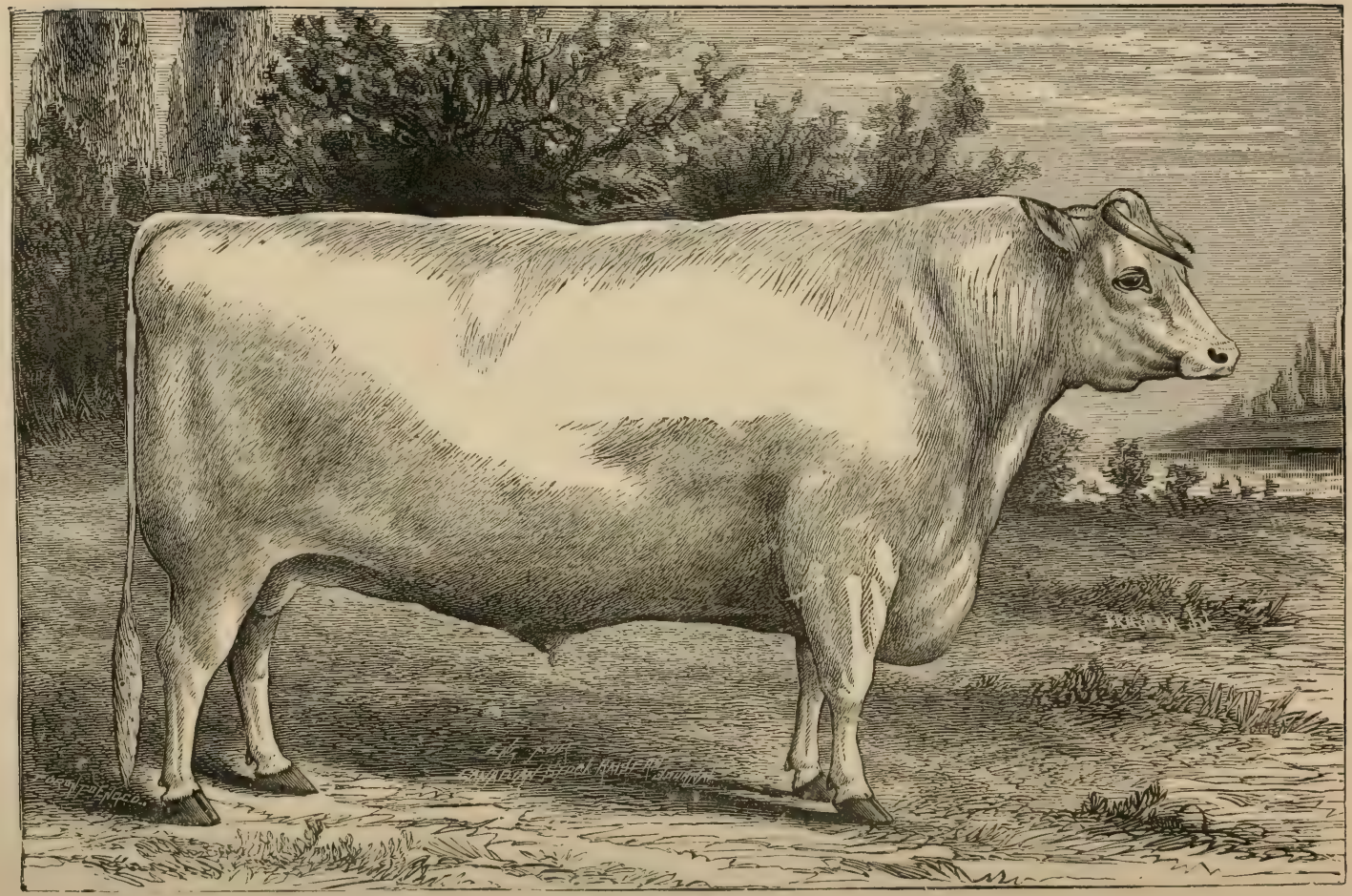
Early Finished Beef.

This is a very fair illustration of what was, according to all accounts, the heaviest steer of his age in Canada, and possibly even in the United States, or Europe, during 1883.

The question of the early maturing of beef cannot be too often held up to our farmers, and it is very satisfactory to find that Ontario is as alive in this as any other country. The animal in this example was a pure bred shorthorn, calved 6th May, 1881, bred by Mr. C. Hodgson, Whitevale, Ontario, and bought by us from Mr. Hope, of Bow Park, when nineteen months old, so all we had to do was to finish him. In build, "The White Duke," was by no means perfect, nor equal to some others from which he took honours in the show ring. Possibly no fault could be found with anything forward



SYBILL'S DARLING 2ND (4611).



THE WHITE DUKE.

of the loins, but he was decidedly deficient in width and depth of hind-quarters—(the illustration shows a better flank and hams than the animal possessed). In handling, an quality otherwise, he was a good average but nothing more, but in width and filling of fore-quarters, with a delightful head, nothing better could be desired. When killed at Toronto, on 17th December, 1883, this steer weighed 2,110 lbs, (having lost 85 lbs. by show handling,) and gave 72 lbs. of butchers' meat to every 100 lbs. of his live weight. With this very large proportion there was no coarseness, nor patchyness, but good moulding and fine graining throughout.

When asked, as I have often been, what we fed "The White Duke" upon, the best answer I could give was "ask me what he *did not get.*"

The following opinion upon this animal is by our practical beef expert, Mr. Woods:—

The famous steer fed at the Experimental Farm, when cut up more than sustained the reputation he won when alive. That he should attain the weight of 2,110 pounds in two years and seven months, no doubt suggested to many the suspicion that his carcase would be found to contain an undue proportion of fat. But notwithstanding his being the heaviest cattle beast for his age on the continent, the carcase shows an immense development of the juciest and most tender of flesh, and only a small proportion of fat.

Chine measurement at second rib shows 10½ inches; mixed meat or flesh 6½ inches; length of lean or marbled flesh along rib 7½ inches. The brisket measures 6½ inches cut on the square of the best mixed beef I have ever seen in a two year old steer. Neck, it may be said, he had none, as from point of shoulder to horn was filled level with a mass of rich beef. The marbling and regularity of lean and fat as the different joints lay on the table arrested the attention of every practical man who passed the stall. The flesh at the eighth rib is one foot thick, and the selvage, or fat only, one inch. In short every cut shows that intermixture of red and white known as marbling, in admirable development. The interstices of fat are thin, and the outer-coating of fat is laid on with great evenness, and never in too great quantity.

This animal is, in fact, as near the ideal of profitable beef, for butcher and consumer alike, as could be desired; with little bone, and flesh cherry red, juicy and fine, extending to the horns. The carcase shows what may be accomplished in securing early maturity and the large profit to the stock-raiser which this implies. It is interesting to note that this animal yields the extraordinary amount of 73 lbs of meat, dead weight, to 100 lbs. live weight. The average of good animals placed on the market is only 60 lbs. The very highest record at the recent Chicago Fat Stock Show was 69½ lbs., or three and a half lbs., less than White Duke's record.

The hind quarters were not cut, but as they hung from the hooks they looked like huge squares of flesh without one ounce of superfluous fat. Taking his age and live weight, and weight of dressed meat to live weight will probably place White Duke at the top of all steers yet raised.

The Great Beef Contest at the Ontario Experimental Farm.

Having now got over the initiatory work of establishing herds, and acclimatizing breeds, we are devoting considerable attention to the making of grades for milk and beef respectively. Our progress in milk experiments is in advance of the other as evidenced in previous reports. We make no excuse for this. Our past beefing experiments have been with high graded shorthorns, and the facts, to date, are sufficient to base upon in any comparison with other grades, as we will have to do when time calls; and what I wish to do in this chapter is to place on record what our Farm has on hand for such a purpose.

The same cows, well graded shorthorns, averaging six years, that have been used to produce the steers, with a thorough-bred shorthorn bull, were selected to mate with the Hereford and Aberdeen poll bulls. Necessarily, one of the difficulties is to arrange about equal birth-dates, and another is to get bull calves. We have been more fortunate with the latter than the former, as shown by the following list:

HEREFORD GRADE STEERS :

9th April, 1882, "*Huntingdon*," No. 184 (ear label).
6th October, 1882, "*Heathfield*," No. 193. "
28th Octoher, 1882, "*Hartford*," No. 191. "

ABERDEEN ANGUS POLL GRADE STEERS :

24th June, 1882, "*Aberdeen*," No. 183.
27th June, 1882, "*Aboyne*," No. 179.
2nd of August, 1882, "*Abernethy*," No. 182.

SHORT-HORN GRADE STEERS :

15th December, 1881, "*Dudley*," No. 285.
10th March, 1882, "*Derby*," No. 290.
16th March, 1882, "*Digby*," No. 292.

The Hereford and Aberdeen polls are of our own breeding ; the Short-horns from George Moore, Esq., of Waterloo, and H. Henderson, Esq., of Guelph. It would have been more complete if all had been of our own breeding, but we had none of about equal stamp and age for such an important contest. They are from cows similar to those that gave the Hereford and Aberdeen poll grades, and food and management nearly equal to what they received. Taken altogether the Short-horn grades had not been so well done to, but not much less so.

These nine animals, representing the three greatest breeders of the world, are thus on hand for the most interesting and valuable contests of breeds we have had at the Farm. By such work we hope to add to the accurate knowledge of facts accumulating from various sources, and we do not know that anyone has ever had the same variety, sex, age and grading, under similar management at one place.

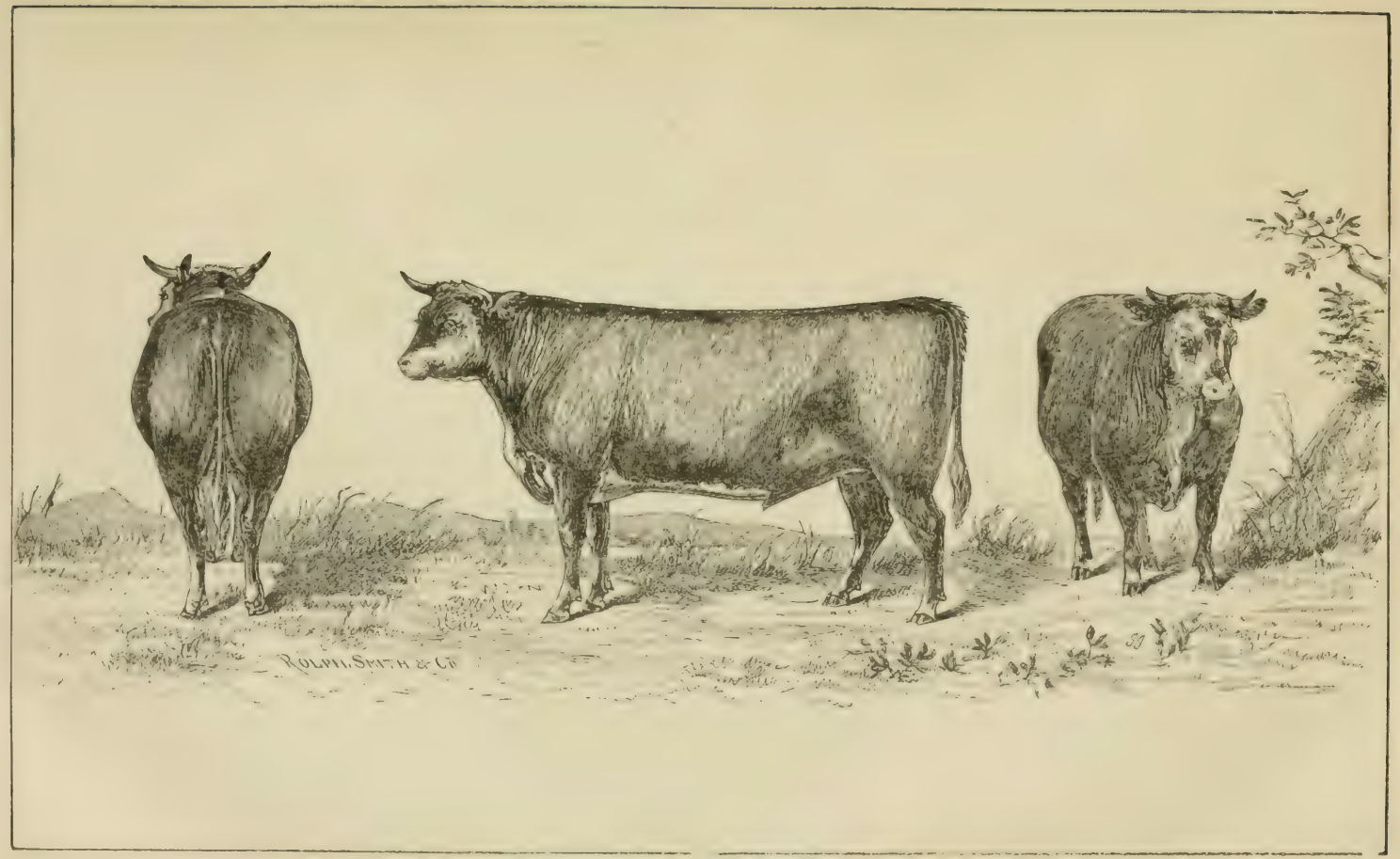
To add to the interest of this section of our experimental duties, I have pleasure in submitting well executed pencil sketch groups of each of the classes, which give a good idea of their general stamp, and indeed some of their detail points. As it is best to speak of the *average* animal, when weights and ages are under discussion, the following will be useful as applicable to 1st December, 1883, when the Herefords and Polls were one year and four months old, and the Durhams one year and ten months old :—

Hereford, average birthday, 17th July, 1882, and weight .....1054 lbs.
Aberdeen-Angus, average birthday, 15th July, 1882, and weight..1155 lbs.
Durham, average birthday, 1st February, 1882, and weight ....1237 lbs.

The practical feeder will at once observe that we are handling something over the average Canadian store steer, or indeed of any other country, because a beefing animal now 570 days old, and weighing 1,150 lbs., will scale at least 1,800 lbs. at Christmas, 1884, when only two years and seven months old.

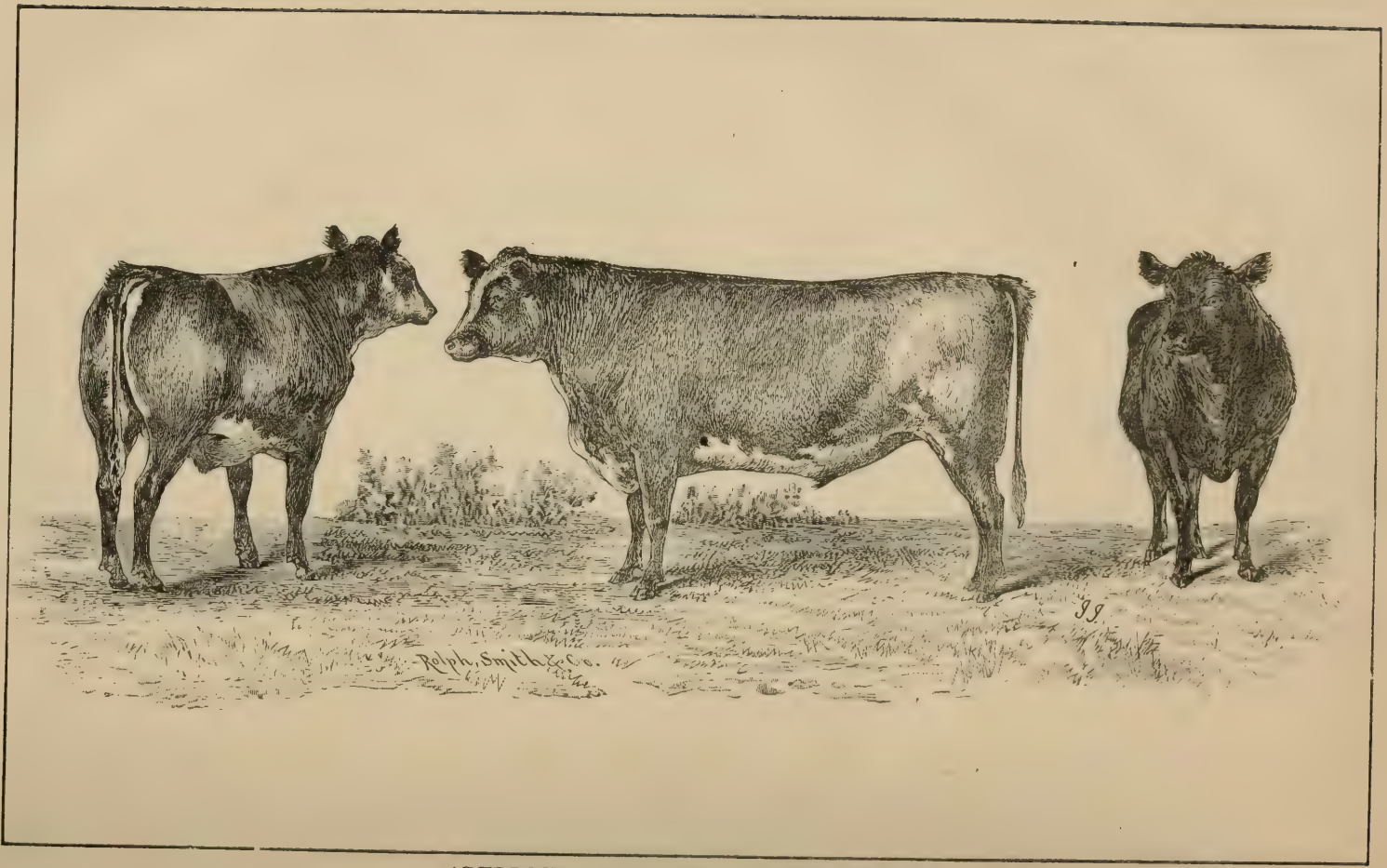
It would be premature to make many comparisons at this stage of the contest, but, as an accompaniment to the illustrations, the keen reader will accept of the following sketch of their build, and general appearance.

The average Hereford is as well marked in colour as the thorough-bred, but with a tendency to red spotting in the face and a few small white spots over the body ; the horn is quite distinct, not heavy, well set, and of a nice oval ; the eye is fuller and more placid than the average pure bred animal, either male or female, and the whole head a very intelligent one. The top animal of this group (the left one in the illustration), is the youngest, and as yet the smallest. He does not preserve the great width of the fore-quarters of a shorthorn, but in the details of barrel and hind-quarters there is all the model of a beefer ; the fullness, depth and width of twist and hams are simply perfect. There is not one of the nine equal to this in these respects. The Hereford grade *bone* here is not of that extra fineness found elsewhere, and the handling is just what it ought



HEREFORD GRADE STEERS.

SHORT HORN GRADE STEERS.



ABERDEEN ANGUS POLL GRADE STEERS

to be—Hereford quality. The chunky evenness and tidiness, strength with quality, and full fleshiness of the kind is very typical.

The Aberdeen Angus polls cannot be said, all over, to be so typical of their kind by colour, as the Herefords. The illustration shows a greyness in two, which remind me of splendid lessons I got from Mr. McCombie, of Tillyfour, in 1864, when some of his "grand ones" were of that hue. The other animal of this group is perfectly black all over, with the exception of a white spot on the under line. The second impression of these is a beefyness—a semi-grossness almost, a sort of dead language that says, "we know nothing about milk in our family, and the fat grazing of the Hereford or the stall feeding of the Shorthorn is all we want." The centre animal of the group may be taken as representing his kind: no horn, not even a fast scur to tell of his mother's side; a strong, prominent poll, with plenty of hair, a sleepy eye, and such a broad fine mouth and muzzle as delights the keen judge; a little flabbyness of skin under the jaw, and its perfect development on the bosom, which indicates quality with character; neck, shoulder, and forward depth, as well as the top width forward are first-class, but the loin falls off both in width and strength—not such a great deal, but yet not perfect. We should have a deeper flank, but in all other respects this individual is very even—a grand mellowness under a moderate skin, and plenty of bone without coarseness. The general stamp may be inferred from the fact that on the 28th September last we were offered $100 for this animal, when he weighed 1,020 lbs. at fourteen months; object, to exhibit at United States fairs. Some of our visiting critics think the black steer will come out best ere Christmas, 1884; he is more reachy and finer fleshed meantime, but does not indicate the open constitution of the other—what may be called the assimilating character of a beefer.

The Shorthorn grade steers are not supposed to be representative of any particular colour, two are pure white, the other roan, which is oldest by three months—a 15th of December calf. There is not a model among the three, the heaviest is both best in handling and heaviest in bone; the smallest is the more even all through, and the oldest is the highest standing and more wedgy. In saying "no model," I do not mean that the animals are under average, but that they do not come up to the well known Shorthorn standard.

IV.—THE EXPERIMENTAL DEPARTMENT.

1.—Feeding Experiments 1882-83.

In criticising the Live Stock feeding experiments of this station, we must not forget that however much they may appear to correspond in objects with others in Europe and the United States, some of the regulating conditions are so different that co-operation of any practical value cannot be established. It is the same with field experiments,—the co-operation is scientifically interesting but unreliable as practical guides—the one to the other. Our winters and summers are so characteristic as to demand a complete set of animal and vegetable experiments. Hence the prosecution of these, year by year.

During the past winter (1882-3) we have considerably extended our enquiries, and are again enabled to present materials of decided importance to the Province.

(*a*)—PRESERVING CORN FODDER IN A COMMON ROOT CELLAR.

In the fever of "silo" and "ensilage" during the past two years we have necessarily been most impartial note takers—having stood unconnected to any particular system and unwilling to experiment until British and American ideas were fairly afoot. Before we took any action one thing had been solved: That green, succulent vegetable matters can be easily preserved for an indefinite period, summer and winter, when proper

measures are adopted ; in no other respect have we found much agreement of experience anywhere, founded upon exact experimental data. One says, animals eat the ensilage greedily every time, another that they took only a certain quantity ; one says it is always bitter or acrid, and others declare it is always sweet ; several maintain that it keeps at a high temperature throughout in the silo, while others testify to a cooling down a certain number of days after closing. Animals get fat on it, say some, but others failed to uphold life with it alone. Milk and butter are improved in quantity and quality ; both are injuriously affected, say others. And even chemists are not agreed as to any increase or diminution of nutritive properties.

Our first view of this subject was Provincial, with the question—granting the success of preservation, can the ordinary farmer make use of part of his present root cellerage for ensilaging? If a $1,000, or even a $300 silo is indespensable, many years must elapse before the practice becomes common. We agree with those who say that it matters comparatively litttle whether the fodder improves or looses in feeding value, it is enough, a grand thing, to be able to preserve it green and sound all along, and to be presentable to animals at all times, like regular roots. It would have been easy for us to build an expensive silo.

On the 28th and 29th September we cut and hauled from a field 500 yards distant, twenty-nine and one-fourth (29¼) tons of green corn fodder, passing it immediately through a straw-cutter, driven by a ten horse-power portable engine, cutting into lengths that dropped into the cellar from the machine, and spread and packed as solid as possible by two men. The cost of this was :—

Engine and engineer	$5 00
Feeding straw-cutter	4 50
Men in silo	4 00
Team and driver	6 00
Field loader	2 25
Cutting fodder in field with mower	2 00
	$23 75

The old root cellar thus utilized, stands half under ground—being nine feet deep, and 18 x 15 feet—the walls consisting of stone and lime two feet thick, with a rough surface inside, and an earthen floor. A door in one corner admits on a level to the cattle stables. The newly packed material was at once covered with planed two inch boards, overlapped by half thickness, and loaded with 600 lbs. of stone to every superficial square yard. Heat evolved rapidly and continued strong for two weeks, as was readily ascertained through the planks that formed the doorway ; in this time, also, the material settled down to its final depth of six feet. A strong, distinct brewery or beery smell continued during fermentation, and at all times when the ensilage was broken up with the hand. The silo remained untouched for sixty days. It was opened on the 1st November. About one foot in thickness all round adjoining the wall the fodder was rotten—perfectly eaten up by fermentation, thus showing the necessity of plumbing and smoothing the walls of a silo—inside of this decay the material was fresh, good upon the floor, and good everywhere except around the rough wall.

(*b*)—MILK IN QUANTITY AND QUALITY FROM ENSILAGED CORN.

In order to test the effects of corn thus preserved, upon quantity and quality of milk, we set aside four well balanced common cows that, on an average, were thirty days after calving. The experiment began on the 1st November, and ended 1st January, thus lasting sixty days. In order to check any unusual individual cow influence, and also distribute any other animal tendencies, the cows were alternated—those that received corn during the first half of the period being put to turnips, and those previously on turnips changed to corn. In all such experiments it is necessary to be able to compare the results of the, so to speak, primary food, with something else that may be naturally opposed to

it—one green fodder again another—preserved corn fodder *versus* turnips for example. For want of such *simultaneous* tests, most of the records in this line of work in other places are practically useless, at least unreliable, and all true friends to ensilaging should insist on such duplication.

Each set of cows was allowed one week on its respective diet before note-taking began. It is almost unnecessary to say that those on turnips eat and behaved in the usual manner from such feeding—Swede turnips, hay, and bran being a diet older than Canadian history. At first the cows eat the corn greedily, taking as much as fifty pounds per day during the first week, without any additional material. Gradually, however, they tired of it, fell off in condition, and gave a reduced quantity of milk. At this time—ten days from the start—being satisfied that the animals were going back, hay and bran were added—the bran being mixed with the corn until the regular quantities of 8lb and 2½lb respectively, per head per day were settled upon—similar to what accompanied the turnips. At times, subsequent to this final bill of fare, the cows did not consume more than 12lb per head per day, at others 20lb, and taken all through the experiment, the average consumption was 30lb corn per head per day. At the middle of the term when cows changed places, very much the same experience was realized, a most marked keenness for the ensilage corn, and a gradual unrelish, the hay being generally taken first, and bran appearing to be indespensable as time went on. We several times gave other cattle a taste of the new fodder in the stable, which with any refuse thrown upon the manure pile, was always much liked, all classes and ages seeming to enjoy it.

By all the management, therefore, of this experiment, we obtained the following milk record, each milking being weighed, tested, and set during twenty-four hours for cream per centage, so that the figures represent the result of over 550 observations :

——	Milk per cow per day.	Specific gravity of milk.	Per cent. of cream.
	Lbs.		
From Ensilage Corn	28	108	12½
From Turnips	33	107	12

There are no striking differences between the two results ; the only one, indeed, is that of quantity, and though this amounts to five pounds per cow per day against grain it is not such an extraordinary fact as may be anticipated. But yet it is a fact in this preliminary test, and must be retained for all future reference. We do not expect much, if any difference, in the specific gravity, by lactometer, of milk from cows of similar breed and general stamp as these were, but the percentage, or volume of cream from the milk would be expected to vary considerably with food ; not so here to any appreciable extent. Altogether, then, in regard to milk, the quantity was affected to the extent of 15 per cent. against ensilaged corn.

(*c*)—BUTTER FROM ENSILAGED CORN.

The previous chapters show in what manner cows were fed, and the quantity and quality of the milk obtained from them, and now finally in regard to the butter from the same milk. Four churnings were undertaken toward the end of the period, when, we thought, the effects of food would be the strongest. Of course the cream was taken in each case from corresponding days, and every possible extra-influence on any side guarded against. The common earthenware dash-churn was employed. Butter came on an average in thirty-five minutes, in a room temperature of 55°—everything being sweet and nice. I do not require to submit all details of management, weighing, and testings, and shall simply give the quantity of butter, with a few observations thereon.

BUTTER FROM 100 LBS. CREAM.

From Ensilaged Corn	35 lbs.
From Turnips	46 lbs.

I look upon this butter result as the most important of any obtained throughout the experiment. First it is another proof, added to many others, that the per centage, or volume, of cream is no criterion of its buttery properties—that the bulk of cream does not indicate how much butter it will give; in this example both kinds of milk registered twelve per cent. of cream, and yet the one turned out thirty per cent. more butter than the other—actually about *one-third* more. It is also additional evidence that food affects the quality as much, if not more than the quantity of milk. How the food affected, for and against, I cannot tell, nor possibly can anybody else, but it unquestionably did so in these examples.

But not only were quantity and quality of milk materially influenced, the *colour* of the butter was in every churning highly different, needing no practised eye to say so; that from Ensilaged Corn was of a pale yellow tinge and greasy appearance, as against the very decided and well known healthy looking yellowness of the other. During my visit to the Eastern and Western Dairymen's Associations this year, where samples of the butter were shown, very many good judges were surprised at the difference in colour.

It should be our duty next winter, not only to adopt different methods of preserving corn, but other green fodders, and at the same time carry out a more extended trial of their effects on animal life, as may be considered best for the interests of the Province.—*See chapter "Influences of Food on Dairy Products" in this Report.*

From the plain facts of this experiment we are justified in cautioning our cheese and butter manufacturers against the *exclusive* use, or even the large consumption per cow, of any preserved green fodder possessing a distinct *sourness.* It is no bold statement to question the possibility of such preservation without producing some fermentation, and therefore alcohol—and as milk, butter and cheese produced from the consumption of any form of alcoholic material is badly injured for the market, Ontario should be guarded.

(*d*)—DAMAGED WHEAT IN CATTLE FEEDING.

We grew in field 18 last year, thirteen acres of Diehl wheat, of which one-fourth had been winter killed, and though the crop presented a good early summer appearance, straw became badly rusted, grain did not fill, and harvest brought a miserably dried up, shrivelled, and damaged sample of Fall Wheat. Millers would not even take a present of it, and having no poultry to pamper we concluded to test part of it against other grains in the fattening of cattle.

The wheat was ground in our own mill to a size corresponding with the corn, and other kinds—neither fine, nor very coarse, but rather on the coarse side.

The animals used in the experiment were yearling and two-year old steers. Each had two weeks on wheat, alternating with other grain, as hereinafter recorded, so that the whole period of each set of four tests consisted of fifty-six days. In addition to grain, hay and roots were given, everything being weighed at each diet, and as usual any events accurately noted. It will be interesting to follow each animal:

"Ontario" consumed, from 10th January to 23rd January, 128 lbs. hay, 426 lbs. turnips, and 92½ lbs. wheat, entering at 922 lbs. and weighing 952 lbs. at finish, adding, therefore, 30 lbs. in fourteen days, or fully 2 lb. per day. "Prince Edward" eat, from 26th January to 6th February, 171½ lbs. hay, 667 lbs. roots, and 123½ lbs. broken wheat, and having entered at 1,038 lbs., and come out at 1,070; the addition of 32 lbs. gives 2⅔ lbs per day.

"Ontario," again returned, from 7th to 20th February, consumed 141½ lbs. hay, 735 lbs. roots, and 143 lbs. wheat, increasing from 1,008 lbs. to 1,040 lbs. in fourteen days, and thus making a daily rate of 2⅔ lbs. "Prince Edward," in his turn, from 21st February to 7th March, eat 140½ lbs. hay, 738 lbs. roots, and 134½ lbs. wheat; entry weight 1,091 lbs., and 1,106 lbs. at finish, or a daily increase of fully 1 lb.

Gathering these four tests together we have the following average result, with one animal :—

Daily Consumption of Food.			Daily Increase.
Hay.	Roots.	Wheat.	
lbs.	lbs.	lbs.	lbs.
10⅓	45	9	2

Therefore, a store steer, twenty months old, and weighing 1,030 lbs. on an average of time of experiment, consumed per day 10⅓ lbs. of hay, 45 lbs. turnips, and 9 lbs. broken wheat, upon which, throughout an alternating trial of 56 days, it increased almost exactly two pounds every day.

It took 5 lbs. hay, 23 lbs. roots, and 4½ lbs wheat, to add one pound to the live weight of the average of these animals, at a market cost—that is, the value of the materials on the market at the time, not the cost of producing them—of eight cents, the damaged wheat being reckoned worth one-half cent per pound. The cost per pound of added animal weight, according to the value of the food on the farm, or what it cost the farmer to produce it, may always be put at *one-half* of the market value, and this is the only proper method of charging animal food when the producer is the feeder. If market values are adopted, the feeder receives an immediate profit before the food is actually consumed.

(*e*)—RICE MEAL IN CATTLE FEEDING.

Messrs. Ross, Hall & Co., of Montreal, sent us one-half ton of their rice meal for the purpose of testing it in cattle feeding, with other grains under similar conditions. This form of feed is quite new to us. It is the "Moulie" of Quebec district when the rice is mixed with other materials. Rice, by itself, though high in feeding properties, is too *gritty*, even when ground, to make it most presentable to animals, hence the practice of adding some other grain. That sent us was the same as manufactured by Messrs. Ross, Hall & Co., for the trade, and consisted of

4 parts rice
3 parts oats } all ground.
1 part peas

We set aside four pairs of store steers, averaging 21 months old, and made up of Galloway grades, Hereford grades, Shorthorn grades, and Devon grades, allowing each a test period of twenty-eight days upon rice meal, barley meal, corn meal, and pea meal, alternating throughout the whole period of one hundred and twenty days. Thus each kind of food, and each set of cattle, had a turn of each other during that period, and the experiment in every respect was conducted accurately—every meal weighed, progress noted by weighing the animals every week, and anything in regard to health, or unconsumed food recorded.

In handling results it is best to speak of one animal as representing the average of all, or of a certain set. Every animal got as much as it would consume.

In the first term with rice meal, from 4th December to 1st January, the average cattle beast consumed 291 lbs. hay, 46 lbs. bran, 1,003 lbs. roots, and 167 lbs. of the rice meal. During these twenty-eight days it increased in weight, from 827 lbs. to 879 lbs., or a daily rate of 1·86 lbs.

During the second term, one of another set of steers, from 1st to 29th January,

consumed 207 lbs. hay, 873 lbs. roots, 120 lbs. bran, and 110 lbs. of the rice meal, increasing from 764 lbs. to 800 lbs., which gives a daily increase of 1·30 lbs.

The third term, with other animals, from 29th January to 26th February, eat 301 lbs. hay, 121 lbs. bran, 1,076 lbs. root, and 207 lbs. meal.

The average animal entered at 1,118 lbs., and came out at 1,182 lbs., showing a daily increase of 2·28 lbs.

NOTE.—We had not enough rice meal to carry out the fourth set of this experiment.

Summarizing these results, we obtain the following as the grand average of one animal, through the record of six of them, by a triple set of experiments extending over eighty-four days :—

Daily Consumption of Food.				Daily Increase.
Hay.	Roots.	Bran.	Rice.	
lbs. $9\frac{1}{2}$	lbs. 35	$3\frac{1}{2}$	6	1·81

So then a store steer, averaging from different grades, and weighing 908 lbs., on a mean of the time during which the experiment was conducted, consumed daily $9\frac{1}{2}$ lbs. hay, 35 lbs. turnips, $3\frac{1}{2}$ lbs. bran, and 6 lbs., rice meal, upon which its live weight increased one and eight-tenths pound per day.

Therefore, it took 5 lbs. hay, 19 lbs. roots, 2 lbs. bran, and $3\frac{1}{2}$ lbs. rice meal, to add one pound to the live weight of this average steer. At market rates this cost 12 cents. Hay, $10 per ton ; roots, 9c. per bushel of 60 lbs. ; bran, $13 per ton ; and the rice meal $27.50, at Montreal.

(*f*)—BARLEY MEAL IN CATTLE FEEDING.

This is the first systematic trial given to barley meal by us in the fattening of cattle —much as we have previously used it to horses, and ewes after lambing. Its cheapness this winter induced the experiment now to be recorded.

The average steer from 4th December to 1st January, consumed 257 lbs. hay, 1,006 lbs. roots, 48 lbs. bran, and 269 lbs. barley meal, going in with a weight of 1,016 lbs., and finishing at 1,100 lbs., thus gaining 84 lbs. in 28 days—a daily increase of exactly 3 lbs.

On the second test other animals consumed on an average per head, 300 lbs. hay, 1,011 lbs. roots, 124 lbs. bran, and 225 lbs. barley meal. The entering weight was 1,061 lbs., and 1,106 lbs. at close, making a daily increase of 1·60 lbs.

The third trial consumed 220 lbs. hay, 964 lbs. roots, 121 lbs. bran, and 227 lbs. barley meal, and increased the average animal from 937 lbs. to 1,005 lbs. which is a daily rate of 2·43 lbs.

The fourth test of barley meal began on 25th February, and ended 26th March, during which the average animal eat 220 lbs. hay, 807 lbs. roots, 124 lbs. bran, and 197 lbs. of the meal, and increased from 875 lbs. to 918 lbs., being a daily rate of 1·53 lbs.

From these we have the following abstract :

Daily Consumption of Food.				Daily Increase.
Hay.	Roots.	Bran	Barley.	
lbs.	lbs.	lbs.	lbs.	lbs.
12	46	5	$11\frac{1}{4}$	2·14

The average store steer here weighed 947 lbs. during the mean time of the trial, and consumed daily 12 lbs. hay, 46 lbs. roots, 5 lbs. bran, and 11¼ lbs. barley meal, by which its live weight increased at the rate of 2·14 lbs. per day.

Consequently it took 6 lbs. hay, 25 lbs. roots, 2½ lbs. bran, and 6 lbs. barley meal to add one pound to the live weight of the same average animal, which at market rates cost 14 cents per lb—barley being put at one cent per pound.

(*g*)—CORN MEAL IN CATTLE FEEDING.

It is not because we can purchase corn cheap enough for making beef that we prosecute this branch of the work year after year, but because it is one of the great cereals of this continent, and may yet be common enough in Ontario for such a purpose.

The first set of steers, under this grain, opened on 4th December, and went out on the first of January. During that period the average animal consumed 231 lbs. hay, 845 lbs. roots, 42 lbs. bran, and 203 lbs. corn meal, and increased in weight from 704 lbs. to 764 lbs., thus making a daily mean of 2·14 lbs.

In the second set the consumption of food was 304 lbs. hay, 1,078 lbs. roots, 123 lbs. bran, and 293 lbs. corn. The average steer with this increased from 1,106 lbs. to 1,175 lbs., or a daily rate of 2·46 lbs.

By the third there was consumed 253 lbs. hay, 975 lbs. roots, 129 lbs. bran and 285 lbs. corn meal, by which the average animal rose from 1,004 lbs. to 1,067 lbs., and so made a rate of 2·32 lbs. per day.

Accordingly we obtain over the whole series:

Daily Consumption of Food.				Daily Increase.
Hay.	Roots.	Bran.	Corn.	
lbs.	lbs.	lbs.	lbs.	lbs.
9½	34	3½	9¼	2·31

By which it appears that the average animal, that weighed 970 lbs., consumed daily 9½ lbs. hay, 34 lbs. roots, 3½ lbs. bran, and 9¼ lbs. corn meal, and made a daily increase of 2·31 lbs.

It is thus shown that it took 4⅛ lbs. hay, 15 lbs. roots, 1¼ lbs. bran, and 4⅛ lbs. corn meal, to add one pound to the average animal of the trial, and at a cost of ten cents per pound, placing corn at 1¼ cents per pound.

(*h*)—PEA MEAL IN CATTLE FEEDING.

We have not lost any respect for Ontario's productive legumen, badly destroyed, as it still is, by the untiring bug, in many parts. Its universal application to feeding all classes of live stock—the horse, perhaps, excepted—will always make it welcome in our mixed husbandry. Let us see how it stood its ground in competition with the four other grains.

In the first trial, the average store steer consumed 337 lbs. hay, 1,000 lbs. roots, 48 lbs. bran, and 265 lbs. pea meal—increased from 963 lbs. to 1,061 lbs., and thus made a daily rate of 3½ lbs.

By the second one, the consumption was 230 lbs. hay, 1,005 lbs. roots, 123 lbs. bran, and 248 lbs. pea meal, when the increase rose from 879 to 937 lbs., and gave a daily rate of exactly 2 lbs.

The third trial consumed 196 lbs. hay, 917 lbs. roots, 123 lbs. bran, and 210 lbs. pea meal—increased from 800 to 963 lbs., and consequently made a daily rate of $2\frac{1}{4}$ lbs.

And in the fourth test, the average steer consumed 289 lbs. hay, 1,106 lbs. roots, 97 lbs. bran, and 244 lbs. pea meal, upon which it increased in live weight from 1,182 to 1,220 lbs. Here the daily rate was 1·36 lbs.

The grand average of these is—

Daily Consumption of Food.				Daily Increase.
Hay.	Roots.	Bran.	Pea Meal.	
lbs.	lbs.	lbs.	lbs.	lbs.
$9\frac{1}{3}$	36	$3\frac{1}{2}$	$8\frac{1}{2}$	2·28

Thus by the use of pea meal, the average animal of 988 lbs. consumed $9\frac{1}{3}$ lbs. hay, 36 lbs. roots, $3\frac{1}{2}$ lbs. bran, and $8\frac{1}{2}$ lbs. meal, and gave a daily rate of 2·28 lbs.

So that it took $4\frac{1}{8}$ lbs. hay, 16 lbs. roots, $1\frac{1}{4}$ lbs. bran, and $3\frac{2}{3}$ lbs. meal to add one pound to its live weight, which cost—reckoning the pea meal at $1\frac{1}{4}$ cents—10 cents per pound.

(*j*)—COMPARATIVE RESULTS OF THESE FIVE GRAINS.

It will be readily understood that no comparison can be of much practical value unless every circumstance has been balanced, so far as lies in man's power. In this regard we secured well mated animals of different grades, the previous treatment was made alike, stabling, management, exercise, currying, modes of feeding, salt, water, and all other conditions were as uniform as possible, and as every set of animals was treated to the various grains alternately, the results are actually from no fewer than *eighteen* distinct experiments.

First, with reference to food, increased weight, per head, per day, and actual cost of production.

——	Hay. lbs.	Roots. lbs.	Bran. lbs.	Grain. lbs.	Daily Increase lbs.	Average Weight of Animal lbs.	Actual Cost of Production lbs.
							c.
Wheat, damaged.....	$10\frac{1}{3}$	45	..	9	2·00	1030	$4\frac{1}{2}$
Rice Meal	$9\frac{1}{2}$	35	$3\frac{1}{2}$	6	1·81	928	7
Barley Meal	12	46	5	$11\frac{1}{4}$	2·14	947	7
Corn Meal.....	$9\frac{1}{2}$	34	$3\frac{1}{2}$	$9\frac{1}{4}$	2·31	970	$5\frac{1}{2}$
Pea Meal	$9\frac{1}{3}$	36	$3\frac{1}{2}$	$8\frac{1}{2}$	2·28	988	5
Mean.....	10	39	4	9	2·11	973	6

The first thing the practical feeder asks, is—what does it cost?—and although this is contrary to the natural line of inquiry, it is as well to make the lesson as coformable as possible to those for whose benefit these tests were undertaken.

I think the very first thing is to throw out the wheat altogether from the discussion.

When viewed from the world's standpoint, it has no place among the rougher grains for cattle feeding. Special circumstances only, similar to those that brought about the experiment, would warrant its withdrawal from the table of the people. At the same time it is certainly most interesting to find, as may be on record in other countries, though we have not seen it, that even *damaged* wheat produces cheaper beef than any of the other valuable grains. In this respect alone it is important to know that, not only poultry and pigs, but even cattle can make economical use of wheat, when properly presented. Had we made a fine flour of it, in place of breaking only, and thus maintaining a proper grittiness, the cattle beast could not have *mouthed* it for swallowing ; the gummy nature of the wheat in a fine condition clogs the mouth and is more indigestible. It will be noticed that over the average quantity of hay and roots was consumed along with wheat, which was due, probably, more to the animal need of them in association with this grain than to the slightly larger size of the average steer. Had good wheat of the average price of $1 per bushel been used, and granting a somewhat better result from the good material, the cost of production of the beef would have stood about seven cents per pound.

Confining the comparison, therefore to the pea, corn, barley and rice, the cost of production is distinctly in favour of peas, charging each at the same price per pound, or one one-fourth cent. This must be owing to the less quantity of peas consumed, as the better daily increase is from corn and not peas, and the other foods in each example were about alike in quantities. In the case of barley and rice meal, the cost of production is very much higher than either corn or peas—thirty per cent. more—even though barley was cheaper, and less of the rice consumed. But much more barley was eaten than any other grain ; the animals took it, required it, I have no doubt ; not only so, but they actually consumed more hay, roots, and bran along with the barley than in any other cases, and consequently, although barley is charged at only one cent per pound, the cost of production is comparatively higher. The rice meal, as a producer of beef, costs as much as the barley, because although not more than half of it was consumed by the average animal, it costs more in the market and did not give such a large daily rate of increase. Were such a thing possible as equal results from the consumption of different quantities of different foods of like prices, the rice meal would take the lead, but the cattle did not eat so much—would not do it, and hence the greater cost and less daily rate per head.

The daily rate of increase per head forms a very interesting column of this comparative table, and requires little explanation. In this case it is different from those spoken of in Chapters XI. and XII., because the increase is purely applicable to the period of the experiment, and not from birth. The rates are large, and are evidence of several things—of a healthy lot of young growing animals ; of Ontario winter conditions, continuously frosty weather especially, being favourable to stall feeding ; of careful management, and also of rich foods. The order of this rate from greatest to least is, corn, peas, barley, wheat, and rice meal.

Another point of practical importance to the feeder is the quantity consumed by store cattle of a given weight. It is said that most animals eat in proportion to their weight under average conditions of age, surroundings, and fatness, and as our average cattle beast in this example is about 1,000 lbs., the proportion is readily noted.

In 10 lbs. hay, 39 lbs. turnips, 4 lbs. bran, and 9 lbs grain, kinds allowed for, there are 29 lbs. water, and 23 lbs. dry substances, so that we obtained one pound of flesh for every 11 lbs. nearly of these dry substances—this is half chemistry, but not too deep for our average farmer. The average animal of 1,000 lbs. say, was able to consume, and digest very advantageously, foods in which it obtained 4 lbs. of water to the 100 of its weight, and fully 2 lbs. of dry substance to each of these hundreds. Of course the animal drank additional water, and had all the salt it would take. We never limit the salt. So then a 1,000 lb. steer will consume daily, to advantage, a mixture of foods adapted to his growth, amounting to one-sixteenth of his weight. There is no danger, at any rate, in giving 1 lb. of grain to every 100 lbs. the animal weighs ; equal quantities of grain and hay, twice their weight of roots, and one-fourth their weight of bran is liberal, healthy, and paying feeding.

With reference to some of our previous experimental cattle-feeding, Sir J. B. Laws, of England, writes me: "With regard to the large increase which you have obtained by feeding with pease instead of cereal grains, there is not sufficient data"—chemical—"existing in your information to draw a conclusion. As a rule, I should not be disposed to place a higher value upon pease or beans as food than upon cereals, and I am tolerably certain that food of the composition of the cereal grains contains as much nitrogen to the non-nitrogenous food as is necessary; but we have been making a large number of analysis of roots—turnips and mangolds—and we find that not more than one-third of the whole of the nitrogen they contain *may* be in the form of albumin; it is possible therefore, that your diet might be very low in nitrogen when you did not use pease; on the other hand you might have quite as much difference in your increase even if your steers had all been fed with the same food. Your observation respecting the unusual consumption of water is fully confirmed here."

We shall be pleased for a continuation of such able criticism on our work here—particularly in regard to roots, as submitted in the following chapter.

(*k*)—SUGAR BEET, MANGOLDS AND TURNIPS IN THE GROWTH OF YOUNG CATTLE.

The position of roots in Ontario has always been a most important one, as they must always be where housing of live stock is imperative. No doubt, events may arise in agricultural practice—discoveries—that will bring about a complete revolution in the system of green fodders for winter use. For example, the present enquiries about the ensilaging of fodders may be one that will ere long narrow the root area of some countries, but even then, I am of opinion that turnips, mangolds, and sugar beet will remain as a distinct form of food, irrespective of ensilaging, not only because of their peculiar adaptability to live stock sustenance, but also as an almost indispensable crop in rotations.

The most of our farmers are familiar with turnips, some with mangolds, and comparatively few know much about the sugar beet. In chemistry they stand as follows:—

——	Albuminoids.	Crude Fibre.	Carbohydrates.	Fat.	Comparative Feeding Value.
Sugar Beet	1.0	.9	15.4	.1	.87
Mangolds	1.1	.8	9.1	.1	.63
Turnips, Swede	1.1	1.3	5.3	.1	.48

If these hold good in actual practice we will find the sugar beet much in advance for feeding purposes, and the mangold superior to the Swede turnip—all differing about thirty per cent.

I am not at all satisfied with the arrangement of this experiment as that to bring out the object in view, and yet I do not see how much alteration would have bettered. In order to ascertain the effects of a certain food, that food must be the overruling regulator throughout the trial, and no other kind should, if possible, accompany it so as to interfere materially with its special effects. This looks well theoretically, but in practice, can it always be done? For example, what would the effect have been with these fattening steers had hay and roots alone been fed, as is common with young cattle in Britain? In our winter conditions such food is not sufficient to maintain steady, not to speak of vigorous, growth, and to allow the animals to go back, or even keep their own, would vitiate all experimental issue. The animal system must, in all its functions be maintained and increased day by day, as otherwise the effect of any special food is overborne by the *wants* which exist through insufficient maintenance. Unless there be an even flow

of all the animal life, no experimental work can be safely pursued. I say then that, in our circumstances at least, it is necessary to feed grain with the roots and hay, the grain was not in such quantity as to overrule everything else—being about two-thirds only of what is usually given in the ordinary feeding of such cattle. But, besides these considerations, I think the nature of the green fodders, called roots, in this case is one that by *bulk*, and their different chemical composition, in association with so much water must decide their power of influencing animal growth.

The experiment began on 4th December, and ended 26th February, the period being divided into three four-week terms so as to give each set of two animals a turn upon the three kinds of roots. I need not submit all the details of each term, but at once abstract the whole series, thus :

Result of 84 days' test of sugar beet, mangolds, and turnips in cattle feeding.

——	Hay.	Bran.	Grain.	Roots.	Average Weight of Animals.	Daily Increase Per Head.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Sugar Beet	10¼	3	6½	52	1059	2.31=2.70
Mangolds	11½	3	6½	55	1063	2.38
Turnips	12	3	6½	52	1061	2.30
Means	11⅓	3	6½	53	1061	2.33

One of the cattle, while upon sugar beet during the third term, lost considerably in weight in consequence of sickness ; were this term eliminated, the sugar beet daily increase would be 2·84 in place of 2·31, or were it brought up to the average of its own other two terms, the daily increase would be 2·70. It is but fair to keep this circumstance clearly in view in our criticism.

The general result of this experiment gives cause for serious reflection, when compared with others in this report. In the latter cases, animals of the same stamp and weight gave *less* results from thirty per cent. more grain, similar hay, and twenty per cent. *less roots*, than those under these root trials. What may be the cause of this ? The grain was pea meal, the effects of which are well-known to us, and the cattle got what roots they could consume. The very even quantities of food of all kinds consumed in this experiment is noticeable—the grain and bran were of course made so—but in others the animals got what they wanted. The result in the three kinds of roots, accords with chemical indications, as previously noted—Sugar beet being first, with a daily rate of 2·70 (allowance being made for sickness of one of the animals) ; mangolds next, with 2·38, and Swede turnips last, at 2·30 pounds per head per day.

(*l*)—EXAMPLE OF A DAILY INCREASE OF 2½ LBS. PER HEAD.

In speaking of the weight of a fattened cattle beast we have to consider :

Breed,
Weight of Calf when dropped.
Food,
Management, and
Age.

The nearer birth the greater the daily rate until the calf weight is lost among the tens-of-hundreds. Thus, a calf weighing 750 lbs., is due about ten per cent. to its birth weight ; the yearling that weighs 1,000, seven and one-half per cent ; the two-year-old scaling 1,500, five per cent. ; and the finished, or rather the over-fed show beast of 2,000 lbs. can only record about three and three-fourths of its weight as obtained from the average birth weight of 75 pounds. Until the animal therefore is over 1,000 lbs., we

should always remember the effect of its birth weight, thereafter it may be left out of calculation.

The example I wish to submit to our breeders and feeders now, is that of a pure white thorough-bred Shorthorn steer, calved 6th May, 1881, bred by Mr. Hudson, of Myrtle, and bought by us from Mr. Hope, of Bow Park. On the 9th April, when 703 days old, it weighed 1,710 lbs., which of course gives a daily rate of 2·43 lbs.; the calf weight from this would reduce the actual daily increase to 2·33 lbs.—something, no doubt, but not enough to interfere when understood in practice, as noticed above.

A yearling steer, over 1,700 lbs. is unquestionably a fine example of what breed, food and management can do, and if we do not spoil him, he should scale 2,000 lbs. when two years and four months old, at the Provincial Exhibition here on 25th September. The daily *summer* increase will be much less than the past record, however.

This animal was sold at the public sale on 28th September, for $270, when the weight was 2,010 lbs.

(*m*)—HEREFORD AND ABERDEEN POLL GRADE STEER CALVES.

Having now got over the initiatory work of establishing herds, and acclimatizing breeds, we are devoting considerable attention to the making of grades for milk and beef respectively. Our progress in milk experiments is in advance of the other as evidenced in previous reports, as also herewith. We make no excuse for this. Our past beefing experiments have been with high graded shorthorns, and the facts, to date, are sufficient to base upon in any comparison with other grades, as we will have to do when time calls; and what I wish to do in this chapter is to place on record what our Farm has on hand for such a purpose.

The same cows, well graded shorthorns, averaging six years, that have been used to produce the steers, with a thorough-bred shorthorn bull, were selected to mate with the Hereford and Aberdeen poll bulls. Necessarily, one of the difficulties is to arrange about equal birth-dates, and another is to get bull calves. We have been more fortunate with the latter than the former, as shown by the following list:

Hereford Grade Steers:

9th April, 1882, "*Huntingdon*," No 184 (ear label).
6th October, 1882, "*Heathfield*," No. 193. "
28th October, 1882, "*Hartford*," No. 191. "

Aberdeen Poll Grade Steers:

24th June, 1882, "*Aberdeen*," No. 183.
27th June, 1882, "*Aboyne*," No. 179.
2nd August, 1882, "*Abernethy*," No. 182.

On the 9th of April, 1883, the earliest birth of the lot, when a Hereford was one year old, weights, ages in days, and daily rates were as follows:

	Weight, 9th April, 1883.	Age in days.	Daily rate of Increase.
	lbs.		lbs.
Hereford—			
Huntingdon	790	365	2.16
Heathfield	552	185	3.00
Hartford	492	163	3.02
Aberdeen Poll—			
Aberdeen	740	289	2.56
Aboyne	750	286	2.60
Abernethy	670	243	2.75

A mean of 2·73 for the Hereford, and 2·64 for the Aberdeen poll; practically equal, considering age, according to Chapter XI. herewith.

Now for Christmas, 1884.

(*n*)—TESTING MILK, CREAM AND BUTTER FROM TEN BREEDS OF COWS.

I have never seen, in all the necessary detail, a special work on the breeds of cattle most suitable for the dairy and creamery. The discussion of the subject is even not as plentiful as might be expected, amidst all the keenness and ability of our Agricultural Associations. Dairymen are either satisfied with what they possess, or may be, have been waiting for their Experimental Station to say something on such a big, irregular, and largely uncultivated field of inquiry. I think much of this indifference is only apparent, and not real, as *age* has not yet given Ontario opportunity to test what, under her conditions, are best for cheese and butter respectively.

To say that we cannot do better than follow what older nations are doing in this regard is admitting that the cow is but a machine devised to produce, irrespective of conditions that, we know, make and unmake higher animal life, and would at the same time be ignoring what we have already done in improving upon the practice of other countries in the making of cheese itself. It is our place as a young nation to prove as we grow, and establish nothing without a thorough test—again and again. That this has been much of our work at the Ontario Experimental Farm is well known, and now I have the honour of submitting what various breeds of cattle there have said to the Province during the last seven years—what we get, and what we cannot get from each.

And first of all I desire to put on record that there exists no such thing as a *General Purpose Cow*, as understood by many of us. There is no breed of cattle that will fill the butcher's stall, the milk pail, the cheese vat, and the butter can, as each should be done in these days—and must be done in order to the desired success. That some can do so to a greater measure than others we know, but that any one can, or ever will do so, and aggregate equal to the average of breeds, is just as certain as that cheese is not always cheese.

Even the world's work of these times is *specialities*, and not the one man fit to do many things well. Agriculture is speedily and surely dividing herself into grain, flesh, and wool, cheese and butter.

No two perfect and distinct products, as *now required*, can be got from any one breed of cattle or sheep under any sort of conditions, anywhere, however favorable.

I challenge any one to name a breed of cattle or sheep that gives an annual produce of two things equal to the like class of things, from two separate breeds that I will name. This provision of nature cannot be disturbed by all the science and art of man, and yet few things speak of the "Great Balancer" so beautifully as the well known fact that when we give proper market value for all the points of all classes of live stock, no one set of them overtops any other to any material extent, thus, then, it is knowing what we want, and securing it.

The question for Ontario in regard to adaptability of breeds is not exactly what characterizes them in their own lands, but what they are able to do after years of trial in the district requiring them. No influence is as strong as climate; food with Ontario is not a matter of any trouble, comparatively, but the ability of individual breeds and animals to withstand the extremes of temperature is the great regulator of settling down to business. Of course there are in every breed certain inherent properties that cannot be driven out by any form of unsuitability—whether climate, food or management, and consequently we can build upon their perpetuation in a new land, with almost unfailing certainty, yet other things submit to physical conditions—invariably deteriorating—rarely improving.

Ontario has had sufficient experience of several breeds to place them exactly either for beef, milk, cheese or butter, and yet we are weak in knowledge of others that hold a good name in other countries. I refer particularly to the Holstein and Guernsey. This

Experimental Farm should be in possession of these, in view of information similar to what I am now about to submit.

What are the requisites of a first-class dairy cow, is the question before us in this enquiry. Men differ in their likes of individual animals for particular purposes, and much of this will be found to arise from experience under various conditions—that such and such a stamp of cow has done well or poorly with either, where food, management, and the particular class of farm also differed. We forget this too often in comparing notes. The cow we want in Ontario for the dairy, on an average of all influences, should combine the following qualities:

An early maturer and breeder, giving her first calf when two and one-half years old, not to be a full milker before calving, necessarily, because of more trouble and deaths a particularly warm hearted mother is not wanted—a whole week is sometimes lost by fretting—breeds and individuals differing very much in this regard. We want both quantity and quality of milk for the dairy and creamery; the cow must be a free milker, as in a herd of fifty the loss of *time* alone in one season would amount to actually *twenty five days*. We should have nothing to do with a vicious cow whatever her points may, be as temper affects the very *quality* of the milk, not to speak of other drawbacks. We want, at least, twenty pounds of milk per day on an average, for two hundred days a year. A strict culling out to even this moderate standard would surprise us as a province. We hear often enough of the maximums, and sometimes of the averages per season, bnt never of the minimums. Specific gravity is no true indication of milk quality, and we have tried it by nearly three thousand observations on ten different breeds of cows within the last three years. More than this I do not require to say at present; neither is the *bulk* or volume—usually called per cent—of cream of much significance. The weight of the cream from one hundred pounds of milk, is the proper criterion, and our model dairy cow should always give eight pounds to the hundred. Then, again, nearly one-half of that cream should be butter—a high standard no doubt, but as several items that go to make rich milk are largely in our hands, such a proportion can be attained unquestionably. I submit to better experience than ours, what cheese should be got from every hundred of milk—if I said eleven pounds, or nine only, I might be asking what the management or the cow may not be able to influence.

All these desirable results require a certain machine, which we call a cow. Now just as we build iron and wood to do certain kinds of work, we find in nature most clear evidence of cow machinery—usually called breed, and individual constitution—making very different milk from exactly the same materials, under precisely similar conditions.

Some remarkably good cows seem to bid defiance to all sorts of standards of points, but this does not militate from the value of aiming at a standard that is known to average all the virtues of cow life.

I have pleasure in drawing attention to a table that is the result of nearly *five thousand observations* with ten breeds and grades of cows during the last three years upon seven years' experience of the Ontario Experimental Farm, which, though not full, is yet of such extent as must at least interest anyone desirous of reliable information.

RESULT OF NEARLY 5,000 TESTS ON BREEDS OF CATTLE FOR THE DAIRY AND CREAMERY.

BREED.	Average weight of cow.	Dur. of milking season.	Milk per season.	Sp. Gravity of Milk.	Per cent. of cream.	Cream by weight.	Butter from Milk.	Butter from Cream.	Cheese curd from Milk.	Value Per Season of Milk.	Value Per Season of Cream.	Value Per Season of Butter.	Value Per Season of Cheese.
		Days.	Lbs.			Lbs	Lbs	Lbs	Lbs	$	$	$	$
Shorthorn	1570	170	2550	97	10⅜	8⅔	4⅓	...	12	19	11	22	30
Shorthorn Grade	1450	220	3960	106	8¼	5	2½	46	11	30	10	18	42
Aberdeen Grade	1300	170	2380	111	7	6	3¾	40	11⅛	18	7¼	16	27
Aberdeen Poll Grade	1150	190	3040	109	4½	6⅛	. .	....	....	23	9½	....	....
Hereford	1340	180	2340	97	5½	4½	2	50¼	11⅓	17	5¼	11	26
Hereford Grade	1100	200	3570	106	13¾	6½	2½	40	7	27	11½	18	26
Devon	1050	200	2800	113	7½	8	3½	....	16¼	21	11⅛	19	45
Galloway	1250	190	2470	105	2	6⅓	....	....	9⅓	18½	8	11	23
Ayrshire	1000	210	5250	101	6½	8	3½	....	11⅓	39	21	35	58
Ayrshire Grade	1030	220	4400	102	4⅜	5	....	....	....	33	11	....	....
Jersey	740	200	2500	103	34	37	....	....	.. .	19	57	....	....
Canadian	950	240	4800	95	6½	8	...	....	11⅓	36	19½	29	54

The great beefer of the world, the Durham, is neither a heavy nor a long milker, comparatively, on an average, although some individuals, in the experience of most breeders, are remarkable in both qualities; in the days of their early history they were unquestionably deep and true milkers, but management towards a different object has, during the last eighty years, changed their dairy standard. Though low in specific gravity, the proportion of cream is high, and the quantity of butter from milk the highest of what is illustrated, and possibly second only to the Jersey, which, as yet, we have not had opportunity to investigate *thoroughly*. Even in cheese the Shorthorn is among the best. With this high average we would expect similar characteristics by the use of this breed with the native cows of the country—whether one or more crosses, but the table shows no advantage in richness, though a very large increase to quantity of milk and duration of the season. This Shorthorn grade is undoubtedly the nearest approach we have to what is termed a general purpose cow.

In duration of season and quality of milk, the Aberdeen Poll is not equal to the Shorthorn with which it is comparable as a beefer, and indeed it is the lowest of any in quantity, yet giving by specific gravity the richest of all excepting the Devon. But in fact nobody would look to the Aberdeen Poll for the dairy, though when put to the Canadian, we obtain much more prominence in milking powers with a distinct reduction in per cent. of cream, and yet, curiously enough, a fully better *weight* of cream.

The great beef grazier of England, the Hereford, is in no way better than the Shorthorn and Aberdeen Poll in milk quantity, but of any in our experience giving the largest amount of butter from cream—fully one-half, weight for weight. Its grade is very prominently in advance of it, particularly so in proportion of cream, though one of the lowest in cheesy properties. I find on reference to a recent live stock text-book published in England, that the Ontario Experimental Farm is credited with placing the Hereford Grade as a creamer.

Note, thus far, in disposing of the three greatest beefing breeds of the world, that value in fair measure, could not be got except from the Shorthorn grade ($25), on an average of things, and $20.50 from the Hereford grade.

In all our experimental research, no breed can touch the Devon in registering a high specific gravity and weight of cheese from milk; both are unusually high, and should be accounted for by the dairy expert. I now ask for this explanation. The Devon is also a good average in duration of milking, and, for its size, fair in quantity of milk, and over an average of things, gives $25 per annum—hence possibly the cause of its patronage in the States.

Scotland's hardy beef grazier, the Galloway, has made, in our comparatively small experience of it, at least one unusual record as a milker. I refer to the two per cent. of cream, which of course is a very low proportion, but it must be explained that the line between milk and cream was a very indistinct one, much cream stood below this line and always rose slowly, and much never separated from the milk; evidence, I believe, in any breed of rich milk; so judgment in this case should be cautiously handled.

We have thus gone through what may be called the mixed field of beef and milk, and found but one example that would meet the dairyman's order.

The Ayrshire is unquestionably a heavy milker, long as well as deep, and on an average will give five times her own weight in milk per season. Observe the somewhat low specific gravity of it, however, and indeed I may ask here how it is that all our true milkers—the Ayrshire, Ayrshire grade, Jersey and Canadian—record an average specific gravity of exactly 100, as against the prevailing high record of the beefers and their grades! From 5 to 13 per cent. is a big difference in this respect. It does not mean thinness necessarily, for want of cream as in skimmed milk, gives a higher specific gravity, and pure cream, as is known, will go as low as fifty and thirty. The Ayrshire does not give off cream, however, but stands above the average in cheesyness; thus then, with its great quantity of milk, we get an average value, supposing we desire to obtain a milk, cream, butter, and cheese mean, of $38 a year, and, by a specialty as in cheese alone, of $58 a year.

The Ayrshire with the Canadian, making its grade, is not improved in any respect, in our experience, except one, that is, it continues longer in milk, making, however, a well-balanced dairy cow, on the hardy side, and suitable for some of our districts.

And now, what about the world's great creamer—the Jersey? The great point of this breed is that one-third of its milk, both in volume and weight, is cream, and so, on the basis of valuing milk at ¾c. per lb., cream at 5c., butter at 20c., and cheese at 10c. per lb., the Jersey equals the Ayrshire in giving $57 per annum. We have no experience of butter from Jerseys, but allowing the average of 44 lbs. of butter from the 100 lbs. of cream, as in our experiments, the Jersey would give $88 for butter according to ordinary price; but as Jersey butter is gold, it would fetch actually $250 in place of $88! Shall we say then that this may be the only class where *thoroughbreds* would pay at high prices for ordinary use?

It is not because the Canadian cattle—if there be such a thing really—are native, only that they are placed last in this list. I contend, without any fear of being unseated, that by a proper selection of this class of cows we obtain a higher annual produce for our ordinary dairy purposes than from any other in this record, and that they are best adapted to the present system of management. As a natural result of general agricultural progress—not special progress always—this special class of cattle will gradually disappear, and unless we supplement with something else—perhaps the Holstein, the Guernsey, or may be a less beefy stamp, by careful selection, of the Shorthorn grade, our dairy interests will suffer. I claim for what is called the Canadian cow, a better defined position, and a higher status than has hitherto been accorded to her. "Pedigree" is well; "blood" is good; but *milk*, at a dairy or creamery, is better than either of them.

(*o*)—WOOL AND MUTTON.

We grow systematically every year, on this farm, *twelve* distinct classes of wool and mutton. As a crop liable to change very readily by conditions of temperature, winter

food, general management, soil, herbage, and exposure, the wool thus produced must have a uniformity well suited for comparison as against its production separately under a variety of these influences. It is not necessary to describe an average fleece of each of these now to be submitted, that is with reference to length, texture, density, lustre, and general stamp; the real point of importance to the Province is their respective values in the present market. In order to set aside any doubts, as regards such values, in the minds of those who have few opportunities of handling, comparing, and pricing with the manufacturers or their agents, I have pleasure in submitting the report of three judges, at a public meeting of farmers and woollen manufacturers, held at Guelph, on the 17th April, 1883, when fleeces of all the classes named were exhibited. The judging, as was done by an extensive woollen manufacturer, a large buyer, and a farmer, well known to be experts at such work, may be taken as thoroughly impartial—without reference to breeds, any particular interest, or other influences. The fleeces were unwashed, but values were given for washed, as ordinarily obtained from farmers.

Prices of Wool, Washed, from Shearlings, April 17th, 1883:—

Merino, French	42c. per lb.
Merino, French, grade	40 "
South Down	32 "
Shropshire Down	32 "
South Down grade	26½ "
Shropshire Down grade	26 "
Cotswold	20 "
Oxford Down	18½ "
Leicester	18½ "
Oxford Down grade	18 "
Leicester grade	18 "
Cotswold grade	18 "

The fleeces were as much representative as could be obtained, and yet, necessarily, at such a public meeting, patrons of different breeds gave opinions for and against, as their individual feelings bid them, but taken altogether no strong objections were taken to any one class.

We have, therefore, *four* classes of wool by present market prices; the highest being the French Merino, with its grade, averaging 41c. per lb.; the South and Shropshire Downs at 32c.; the South and Shropshire Down grades at 26½c.; and the Cotswold, Leicester, and Oxford Down, with their grades, making the lowest class, at an average of 18½c. per lb.

It must not be forgotten that the present market is low for all kinds of wool, and particularly low for long wools.

A grade here means the first cross of the rams of each of the pure breeds with the common ewes of the country—said ewes being very much Leicester.

After prices per pound, we naturally look for average weight of fleeces, and in this matter the following may be taken as close figures:—

Weight of Shearling Fleeces, Unwashed:—

Merino, French, grade	10 lbs.
South Down grade	9 "
Shropshire Down	12 "
Oxford Down grade	13 "
Leicester grade	14 "
Cotswold grade	14 "

It is not necessary in this enquiry to handle the fleeces of the thoroughbreds—the point being to ascertain what they can give us through the common ewes, which alone will offer quantity and cheap production.

Taking these two data as fair, we now obtain the important items of value of wool per head. It is a pity that all farmers do not see how much it is to their interest to leave all wool unwashed. I have written upon this before, and can but repeat that by the present rule of deducting *one-third* for unwashed, every grower of wool must be a loser. I have the conscientious testimony of several of our best manufacturers on the same question, who say that while they prefer to have the washed wool, they are satisfied, as between man and man, that the farmer makes nothing whatever by washing before clipping.

The value, then, of wool unwashed per head from the various grades may be closely estimated as:

Merino grade	$2 70
Shropshire grade	2 08
Leicester grade	1 71
Cotswold grade	1 71
South Down grade	1 60
Oxford Down grade	1 56

I am sure this will surprise some, disappoint some, satisfy others, and convert, maybe, a few. By this table we find again four classes of wool by price per fleece; the highest and very isolated being $2.70 for the Merino (French) grade; the second, that of the Shropshire grade, at $2.08; the third, consisting of Leicester and Cotswold grades, giving $1.71 each; and the South Down and Oxford Down grades nearly equal, at $1.58.

But wool is not everything in this line of our profession—we are not yet Californian or Australian enough to disregard weight, quality, and early maturity of mutton. Our farm has made fully more clear evidence in these than upon wool, and having in previous reports discussed all the stamp and standing of the various grades for the butcher, it is only necessary here to submit weights and prices.

AVERAGE WEIGHT AND VALUE OF MUTTON PER CARCASE: SHEARLINGS.

———	Weight, Live.	Price per Pound.	Value per Carcass.
Shropshire Down grade	165	5½	$9 10
Leicester grade	180	5	9 00
Cotswold grade	180	5	9 00
Oxford Down grade	170	5¼	8 90
South Down grade	160	5	8 85
Merino grade	150	5	7 50

Finally, therefore, in gross value of annual produce we obtain:

Shropshire Down grade	$11 18
Cotswold grade	10 71
Leicester grade	10 71
Oxford Down grade	10 46
South Down grade	10 45
Merino grade	10 20

These are the most reliable indications in our experience, to date, of the annual value of wool and mutton, without reference to cost of production. The equality of the six grades in this respect is remarkable and interesting.

(*p*)—LESSONS OBTAINED FROM 1882-83 EXPERIMENTS.

These briefly, and with the view to convenience several readers.

1. Corn fodder newly cut and drawn from the field when green, cut into inch lengths, packed into a common rough stone root cellar half under ground, and weighted with 600 pounds per superficial square yard can be preserved, except adjoining such a wall, for an indefinite time in a condition fit for animal food, at a cost not exceeding $1 per ton—exclusive of cultivation.

2. In competition with Swede turnips, ensilaged corn fodder gave fifteen per cent. less milk, thirty per cent. less butter, and a poorer marketable butter in colour.

3. *Damaged Wheat* can be very economically used in the fattening of cattle—nine pounds per head per day, gave a daily increase of two pounds per head per day, at a cost of 4½c. per pound to the live weight.

4. *Rice Meal*, in the fattening of cattle, gave a daily increase of 1·81 pounds per head per day, by the use of six pounds per head per day, at a cost of about seven cents per pound.

5. *Barley Meal* in cattle fattening requires a large amount of other foods in association, and 11¼ pounds per head per day gave a daily increase of 2·14 pounds per head per day, at a cost of seven cents per pound live weight.

6. *Corn Meal* took the highest place in a daily rate of increase in the fattening of cattle ; nine and one-fourth pounds per head daily gave 2·31 pounds per head per day, at a cost of 5½c. per pound of the added animal weight.

7. *Pea Meal* gave the second best daily rate of increase at the least cost of all the regular cattle feeding grains. Eight and one-half pounds per head daily gave a rate of 2·28 pounds, at a cost of five cents per pound of the weight added to the animal.

8. A pure bred Shorthorn steer can be brought to a weight of 1,700 pounds when one month under two years old, or a daily rate of increase equal to 2½ pounds per day.

9. Hereford grade steer calves can be made to average 611 pounds in 238 days, or a rate of 2¾ pounds per day.

10. Aberdeen Poll grade steer calves can be made to average 720 pounds in 273 days, or a rate of 2⅔ pounds per day.

11. During winter, a 1,000 pound steer will consume daily ten pounds hay, thirty-nine pounds turnips, four pounds bran, and nine pounds of a mixture of grain, upon which it will add 2·11 pounds to its live weight.

12. One pound of added weight to a 1,000 pound steer can be obtained from the use of various materials that contain eleven pounds of dry substances, chemically.

13. By a large variety of experiments with several classes of cattle, and many kinds of food, we find the actual cost of adding one pound to the live weight of a 1,000 pound animal is six cents to the feeder who grows his own materials, and nearly twelve cents when the food is bought in the regular market—manure and management not considered.

14. *Sugar Beet*, weight for weight with mangolds and turnips, and in association with equal kinds and quantities of other foods, gave the highest returns in feeding cattle or 2.70 pounds per head per day.

15. *Mangolds* gave 2.38 pounds per head per day under similar conditions to the sugar beet.

16. *Turnips* (*Swede*) added 2.30 pounds per day to the average steer that weighed 1,061 pounds under conditions similar to mangolds and sugar beet.

17. There is either a simple natural reason, or a hidden chemical one, in the fact that by the use of less grain and more roots, cattle gave a greater daily return in live weight. See special chapter herewith.

18. The present market for wool and mutton in Ontario is best supplied to the

profit of the farmer by the Shropshire Down shearling grade, which gives annually fourteen per cent. more value than any other in our experience.

19. There is a remarkable uniformity in the annual value of wool and mutton from grades of Cotswolds, Leicester, Merino, Oxford Down and South Down, resulting from differences in weight and value of both products.

20. From nearly 5,000 observations, the following notes have been obtained as evidence of peculiarities, characteristics, or other indications of breeds of cattle :—

(*a*) That there is no such class as a "general purpose" breed—one to do the best for the dairyman and the butcher.

(*b*) An average cow for dairy purposes should give 20 lbs. of milk per day during 200 days of every year; 8 lbs. of cream for every 100 lbs. of milk; 45 lbs. of butter from every 100 lbs. of cream, and fully 10 lbs. of cheese for every 100 lbs. of milk.

(*c*) Bulk, volume, or per cent. of cream is no safe criterion of the quantity of butter in that cream; weight alone is the proper mode of judging.

(*d*) *Breed*, as much, if not more than *food*, affects the quantity and quality of milk, cream, butter, and cheese.

(*e*) In Ontario Experimental farm experience the Shorthorn is an average milker, short in duration per season, low in specific gravity, high in per cent. of cream, proportionately high in butter, and also high in cheese production. The grade of this breed approaches the nearest of any others to what is called a "general purpose cow."

(*f*) The Aberdeen Poll is low in quantity of milk and the second highest of any in specific gravity. The grade of this breed is much improved in milking properties, giving a greater weight of cream, though a lower per cent. of it.

(*g*) The Hereford is not more prominent than the Shorthorn and Aberdeen Poll in regard to milk, except in proportion of butter from cream, in which it is highest. The grade is very prominently in advance, particularly in proportion of cream, but one of the lowest in cheese.

(*h*) The Devon is most distinct in highest specific gravity of milk, and the weight of cheese from milk. We have no experience with the grade of this breed.

(*i*) The Galloway milk appears to be of a peculiar texture—rich, or so small in butter globules as to rise very slowly and very indistinct in the test tube.

(*j*) The Ayrshire is a particularly heavy, long milker, giving five times her own weight per season. The milk is somewhat low in specific gravity, and per cent of cream, but is over the average in cheese production. The Ayrshire grade is not improved in any respect except in duration of milking season.

(*k*) The Jersey is remarkable for proportion of cream, averaging thirty-seven per cent. and giving a value of dairy products, incomparable to any other breed in our experience.

(*l*) The Native, or Common cow of Ontario, not Canada properly, because Quebec in particular stands distinct in her class of dairy cows, takes a high place in value of annual produce for ordinary dairy purposes, and, along with the Shorthorn grade, is peculiarly the dairy cow for the country.

2.—CATTLE FEEDING EXPERIMENTS, 1883–4.

The Series for 1883–4.

We had a grand opportunity this year to arrange an extensive and varied series of feeding experiments with cattle and sheep, and we took advantage of it. The clearing out by the public sale gave stable room for fifty head of cattle, and as many sheep. We had no difficulty in knowing what to feed with; the difficulty consisted in obtaining

an even lot of animals, for we had but ten of our own breeding. I am glad to be able to say it is not now a difficult thing to find well balanced store steers for general feeding, but when an individual equality in breeding, age, size, quality, condition, disposition, and general stamp is made a system in selection, the task is not a small one indeed. But Waterloo and Wellington counties were equal to the occasion, so that by 1st October all were on hand for preparatory feeding. In order thoroughly to place every animal on an equal footing by management previous to actual experimental feeding, they were allowed the range of the pastures two weeks, succeeded by two weeks on hay, roots, and bran in the stall. The students were then detailed to report upon the placing of three animals in each set of experiments, and as there are sixteen sets in this division—that is, exclusive of breeds and cows—and the reporting papers contained six principal points as guides for valuation, there resulted 2884 distinct reccommendations, which, in the hands of thirty second-year and special students—the seventy first-year students not having had the same experience—there were necessarily nearly 9,000 observations to guide this part of the work. The good old cattle judge will say: "I could have made as good a subdivision alone in half an hour, without paper." True, Mr. Oldschool; but, as a school, we have to educate, and this was a capital opportunity to test our old lessons. Every animal has a numbered ear label; every article for every meal, and all the water drank, is carefully weighed, and what remains unconsumed is weighed back. The animals are weighed every week, at the same time of day, and each set of animals is given a change each month, of four weeks. In this manner, each set will go through the whole series of experiments before the middle of June, which will very thoroughly eliminate any set or individual, or unseen peculiarities, which is no inconsiderable element in feeding. The class of steers is Shorthorn grades, from eighteen to thirty months old.

Each student is provided with a copy of monthly results, upon which he is subject to examination at Easter, 1884.

As a matter of interest, the following is a copy of the manner in which the monthly reports are kept, the daily weighings, and other facts, having other forms for abstract file.

WEEKLY REPORT OF FEEDING EXPERIMENTS AT THE ONTARIO EXPERIMENTAL FARM.
(Winter, 1883-4).

CATTLE. *Week Ending*.....*188*

EXPERIMENTS.	Weight on Entry.	Weight on	Weight at Date.	Total Increase.	Weekly Increase.	Daily Increase.	FOOD CONSUMED DURING THE WEEK. Hay.	Roots	Meal.	Bran.	Water, total per Week.
Corn .....3 head											
Peas ..... "											
Oats ..... "											
Barley—*white*..... "											
" —*black*.. ..... "											
Mixture... ..... "											
" with Oil Cake. "											
" " Thorley.. "											
Steamed..... "											
Dry..... "											
Fodder .....9 head											
Shorthorn Grade..... 3 head											
Hereford " ..... "											
Aberdeen Poll..... "											
Ensilage ... . "							En'age, lbs..		Bran, lbs		
Hay ..... "							Hay " .. " "				
Roots ... . "							" " .. " Roots, lbs..				

	MILK. By Measure'nt	MILK. By Weight.	CREAM. Per cent. from Milk by Weight	BUTTER. Per cent. from Milk and from Cream.
Cows fed on Ensilage.....				
" " Roots				
" " Hay				

STABLE TEMPERATURE.

Highest temperature during week.....
Lowest " " " .....
Mean " " " .....
Day of highest temperature .....
" lowest " ....

PRICE OF FOOD.

All Grain..... 1 cent per lb.
Hay..... ½ " "
Roots..... ⅛ " "
Oil Cake..... 1½ " "
Thorley..... 6 " "
Bran ..... ½ " "

In addition to these 48 cattle, we have a most interesting contest between nine head—three each of grade Durhams, Herefords, and Aberdeen polls—as to which, see special chapter herewith. And further, in order to gather more light, on the value of preserved green fodder in the production of milk, cream and butter, in winter, we purchased six cows of the common Canadian stamp, which are being handled as elsewhere detailed.

Thus then altogether we have 63 cattle engaged in experimental feeding this winter.

As an item of study for the uninitiated, allow the memorandum that at the end of the experimental period, the number of weighings of materials etc. will be about 200,000 for cattle alone.

The next explanation is in regard to FOOD,—what and why?

CORN, because a cheap American product that should be more extensively cultivated in Canada, and is used in this contest as one of the standards.

PEAS, because one of the most important coarse grains of Ontario, and usually taken as the Canadian Standard.

OATS, because always reliable with us, and particularly suitable for certain stages of animal life.

BARLEY (Common), because a sure cropper, and peculiar in some of its feeding influences.

BARLEY (Black). This is not yet much cultivated in Canada, but where so, has given such satisfactory results both in produce and weight per bushel, that our testing is important. It has no skin, is very uniform, coarse in texture, and weighs over 60 lbs. per bushel.

MIXTURE (Corn, Peas, Oats and Barley,) as subject for comparison against individual kinds.

MIXTURE with OIL CAKE, for the purpose of ascertaining whether, irrespective of manure value and better handling of the animals, it actually pays to give this standard cake along with other high class grains.

MIXTURE with THORLEY, in order to ascertain the precise effect of this condiment in cattle feeding.

STEAMED Food as a direct test against the same in a dry uncooked state.

DRY, or uncooked, against the steamed.

FODDER, (1) Ensilage. (2) Hay, (3) Roots, separately, with Bran in the production of beef.

With these, the contest was opened on 3rd November, 1883, and will be closed on 14th June, 1884, so as to give a complete circle of tests.

These experiments are under the immediate superintendence of the following gentlemen—students representing their respective classes:

2nd Year, W. Little, of Co. Simcoe, for grain feeding.
1st Year, McKay, of Nova Scotia, " "
2nd Year, Mathewson, of Montreal, for Fodder feeding.
1st Year, Weatherston, of Toronto, " "
2nd Year, Austin, of Ottawa, for steamed food.
1st Year, Butler, of England.
2nd Year, Major, of England, for Dairy.
" " Ballantyne, of Stratford, for Dairy.
1st Year, Henry, of Simcoe Co., for "
" " McIntyre, of Paisley, " "

As a foretaste of what may be expected in our Advance Report of next year, let us criticise the results of the first two months which are already on hand, and necessarily any results are simply provisional.

(*a*) CORN.—During the 1st month, the average animal entered with 965 lbs., and

came out with 1045 during twenty-eight days, thus giving a daily increase of 2·84 lbs. The average animal consumed daily 8½ lbs. hay, 23 lbs. roots, 4½ lbs. Bran, 9 lbs. Corn, and 39 lbs. water. The stable temperature for the month—and of course this applies to all the other testing of the same period—was a mean of 46½°, the highest 62° and lowest 27°.

During the 2nd month, Corn, with animals that came from Barley, entered with an average weight of 1006 lbs. per head and left an average of 1073, or a daily increase of 2·38 lbs. as obtained from 9 lb. hay; 24 lbs. roots: 4½ lbs. bran; 9 lbs. corn, and 40 lbs. water. The temperature of the stables for the period was a mean of 41°, 56° as the highest, and 26° as lowest.

Thus then for two months ending 22nd December, Corn, as a regulating grain in association with other forms of food, gave a daily increase of 2·61 lbs. to an average 1022 lbs. steer, tied up in a mean temperature of 44° but getting one half hour's exercise every day, well groomed and systematically attended to in every respect.

(*b*) Peas.—During the first term the average steer began with 974 lbs. and ended with 1032 lbs., which is a daily increase of 2·07 lbs. The daily consumption of food was 6⅓ lbs. hay; 18½ lbs. roots; 3½ lbs. bran, 7 lbs. peas, and 36½ lbs. water.

For the second term the animal went in at 1045, and scaled 1085 lbs. at finish, which gave a daily average increase of 1·44 per head. This was from 9 lbs. hay; 23 lbs. roots; 4½ lbs. bran; 9 lbs. peas, and 40 lbs. water.

The two terms of eight weeks under peas as a leading food, gave a daily gain of exactly 1½ lbs. to the live weight of a 1034 lbs. store steer.

(*c*) Oats.—These, for the first term, gave a daily rate of 2.90 lbs. the animals having began with 1029, and closed with 1111 lbs. per head. The food consumed daily was 8½ lbs. hay; 22½ lbs. roots; 4½ lbs. bran; 9 lbs. oats, and 42 lbs. water.

The second term, with different animals of course, gave an increase of ·98 lbs. (hardly one pound)—the entrance weight having been 1048 lbs., and 1076 at closing. In this example the food, daily, consisted of 8½ lbs. hay; 23 lbs. roots; 4½ lbs. bran; 8⅙ lbs. oats, and 29 lbs. water.

We obtain therefore an average daily rate of 1·94 lbs. from Oats as the staple food in a course of eight weeks' fattening of yearling, and two year old steers, the average weight of the animal having been 1066 lbs.

(*d*) Barley (six rowed).—For the first term the entrance weight of the average steers was 915 lbs., and its closing weight 1006, thus giving a daily increase of 3·26 lbs. This resulted from a daily consumption of 8½ lbs. hay; 23 lbs. roots; 4½ lbs. bran, 9 lbs. Barley, and 44 lbs. water.

During the second term the steer entered at 969, and stood at 1015 lbs. when finished. This gives a daily rate of 1·79 lbs. The food was 8½ lbs. hay; 24 lbs. roots; 4½ lbs. bran; 8⅓ lbs. Barley, and 34 lbs. water.

Barley to date then, indicates a daily rate of 2·53 lbs. per head, in the growth of a store steer averaging 979 lbs.

(*e*) Black Barley.—The average weight of the store steer on entering upon this food was 905 lbs., and at the expiry of the first term of twenty-eight days it weighed 969 lbs., so that we get a daily rate of 2·26 lbs. The consumption of materials was 8⅓ lbs. hay; 22 lbs. roots; 4½ lbs. bran; 8 lbs. Barley, and 37 lbs. water.

For the second term the entry was 1111 lbs., in the closing weight 1146 lbs. or a daily increase of 1·28 lbs. per head. Food consisted of 9 lbs. hay; 27 lbs. roots; 4⅓ lbs. bran; 8½ lbs. Barley, and 40 lbs. water.

This record, to date, shows a daily rate of 1·77 lbs. per head, with steers that average 1033 lbs.

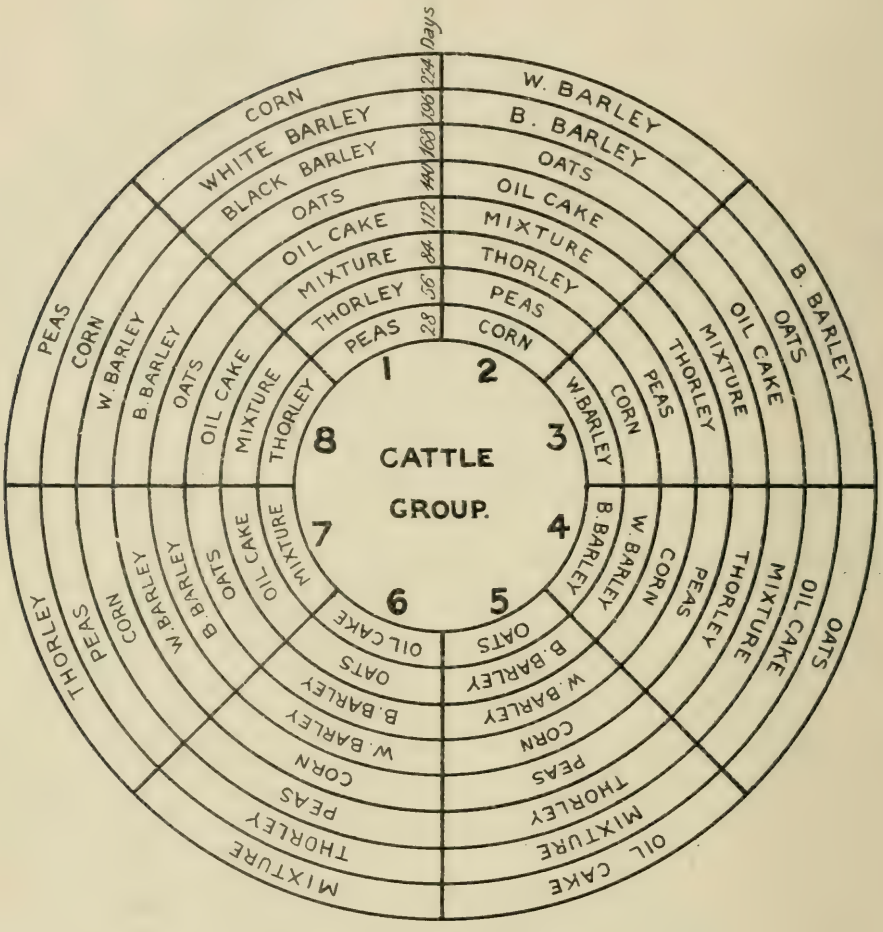
(*f*) Mixture, equal parts of Corn, Peas, Oats, Common Barley, and Black Barley, all ground and mixed.

During the first term, the average animal here consumed 9 lbs. hay; 23 lbs. roots; 4½ lbs. bran, and 9 lbs. of the mixture with 45 lbs. water, by which it increased in weight daily at the rate of 3·28 lbs. weight—919 and 1041 lbs. at entry and closing respectively.

During the second term another set of cattle gave an average product of 2·40 lbs.

GRAIN-FEEDING CARD

From 3rd November, 1883, to 14th June, 1884.



1.—Eight groups of cattle, 3 head each=24 cattle.

2.—Eight kinds of grain=64 distinct tests.

3.—Twenty-eight days of each group on each grain=224 consecutive days.

4.—Seventy-two rations per day=16,128 rations.

5.—Each ration having four kinds of food=167,536 separate weighings.

6.—Fifty pounds average daily food per head=134 tons of food.

7.—Average value of food, ½ cent per pound=$1,340 for period.

8—Result: 32,400 lbs. of beef: value, $2,100 on foot, and experimental knowledge gained= TEN cents for each cattle feeder of Ontario: say, $10,000.

per day, from 8½ lbs. hay; 23 lbs. roots; 4½ lbs. bran, and 9 lbs. of the mixed grain, with 40¼ lbs. water, weighs 1087, and 1155.

Thus, the record for this preparation is 2·84 lbs. per head per day with an average store steer of 1058 lbs.

(*g*) Mixture, with Oil Cake.—The same proportion of Corn, Peas, Oats, and the two Barleys, with the addition of Linseed, or Oil Cake, gave, during the first term, a daily rate of 3·52 lbs. In this were consumed 8½ lbs. hay; 22½ lbs. roots; 4½ lbs. bran, 9 lbs. of the grain, and 44 lbs. water. Entry weight, 949 lbs., closing weight 1045 lbs.

The consumption of food daily during the second term was 8½ lbs. hay; 23 lbs. roots; 4½ lbs. bran; 9 lbs. of the mixture; with 3 lbs. cake, and 47 lbs. water, which gave a rate of 2·37 lbs. Entry weight, 1041 lbs.; closing weight, 1108 lbs.

A two month's record of 2·99 lbs. per head per day, with an animal of 1036 lbs.

(*h*) Mixture, with Thorley's Food (from Hamilton, and Mitchell).—The addition of this well known condiment to the mixture of grain just specified has given, for the first term of one month, a daily record of 3·75 lbs. per head. The daily ration consisted of 9 lbs. hay; 23 lbs. roots; 4 lbs. bran; 8½ lbs. grain; 1½ lbs. of Thorley, and 46 lbs. water. The entrance weight was 982 lbs. and the closing 1088 lbs. of the average store steer.

During the second term the rate of increase was 2·11 lbs. from a daily consumption of 8 lbs. hay; 22½ lbs. roots; 4 lbs. bran; 8⅓ lbs. grain; 1½ lbs. Thorley, and 35 lbs. water. Weight of average steer at entry 1032 lbs., and at closing 1091 lbs. Therefore a two month's record of 2·93 lbs. per head per day, with an average animal of 1048 lbs.

(*i*) Results so far.—Our grain feeding of cattle for 1883–84 has begun its record in the following order of merit:—

1—Mixture with oil cake	2.99	per head	per day.
2—Mixture with Thorley	2.93	,,	,,
3—Mixture	2.84	,,	,,
4—Corn	2.51	,,	,,
5—Barley	2.53	,,	,,
6—Barley, Black	1.77	,,	,,
7—Peas	1.50	,,	,,
8—Oats	.98	,,	,,

A grand mean of 2¼ pounds per head per day, indicates a healthy, well doing, lot of cattle, under good management, meantime, whatever else our 1884 Advance Report will show. Is it not an interesting, and a practically valuable fact, that yearling and two year old steers under such treatment require as much as 40 lbs. of direct water per head per day in an average temperature of 46½°? This is weight for weight for the regular food consumed, in which even turnips and mangolds add one half more of what is nearly direct water to the system.

3.—SHEEP FEEDING EXPERIMENTS, 1883–84.

I desire here simply to place on record that as part of the large series of experiments this winter, we set aside six pens, of three head each, of wether lambs, Oxford and South Down grades; for the purpose of testing food. The regulating foods are:—

Peas.
Beans.
Clover Hay.
Pea Straw.

In addition we are trying the effect of food in the production of wool, by the "high" feeding of one pen, and the "low," or moderate feeding of another, in which of course there will be no exchange of positions.

This set of experiments is in the hands of the Special Live Stock Class.

4.—INFLUENCE OF FOOD ON MILK.

By the end of March, first, we should be in possession of a very important series of observations on the influence of food of various kinds upon the quantity of milk and its quality, as evidenced by cream, butter, and cheese. On 10th November, last, we set aside six common grade cows, purchased specially for this experiment, and selected, of course, as to evenness of age, grade, size, time after calving, and otherwise the stamp of a milker; they are certainly very common cows in the eyes of a beef breeder, but for our purpose have proved most suitable.

We decided to test four forms of feeding milch cows, giving twenty-eight days to each kind, by two cows, and each group of cows a turn of each form of food, thus securing a thorough and systematic experiment throughout a period of five months. Some would be satisfied with one set of cows to each kind of food, but we are determined to duplicate both the cows and the food, so as to ensure greater reliability.

The foods are classified as—

"Ordinary," and consists of hay, roots, and bran.

"Bran," consisting of bran and hay.

"Roots," consisting of roots, hay, and bran.

"Ensilage," consisting of oat fodder ensilage, hay, and bran. The quantities of each will be found in abstract table in these notes.

I find so much already interesting from the results of the past three months, that it is due to the Province and ourselves to make an advance report, with the understanding of its subjection to the fuller notes of the extended period. In these, no reference is necessary to many details, nor to the particular conduct of the different groups of cows, which will come in better afterwards, and accordingly an abstract table with comments will suffice meantime.

But before submitting our testing to this date, there are some things that must not be forgotten:—

1. A primary idea in all strict food testing is the influence a particular food possesses over others, and in order to this it must be given in *over-ruling quantity.*

2. Winter butter is usually paler, and not so good in quality as that from rich pasture, though there is said to be more solid fat in winter than in summer. Quality, therefore, in this reference, may be owing to the existence of certain natural colouring matters more than to any change in chemical composition of the fat.

3. The animal (breed and individuals) influences quantity and quality more than food does.

4. Milk is not simply a secretion, but is actually *part* of the animal, so to speak, a liquified organ, regulated by the detail construction of the particular animal system.

5. As the quantity and quality of milk depends, in the first place, then, on the development of the milk glands, the importance of repeated tests with a variety of cows is evident.

6. But the rapid growth of new cells in the milk glands is kept up by the proper supply of food, and as milk is made up, both in its milk proper, fat or cream, and part of the sugar of *albuminoids*, we must supply them to the animal.

7. The protein or albuminoid increases also the *solid* matter of milk.

8. Quality is less dependent on food than quantity. Feeding cannot convert a *cheese* breed into a butter breed.

9. Is it a fact that the *relative quantities* of the several *solid ingredients* (dry) of milk remain almost constant—quantity of milk and its percentage of *dry* matter varying only?

INFLUENCE OF FOOD ON DAIRY PRODUCTS.

RESULT OF 1,265 EXPERIMENTAL TESTS DURING NOVEMBER, DECEMBER, AND JANUARY, 1883-4.

COW GROUP.	Regulating Food.	Milk per head per day.	Specific Gravity of Milk.	Per cent. of Cream by Bulk.	Cream by Weight from 100 lbs. Milk.	Butter from 100 lbs. Cream.	Butter from 100 lbs. Milk.	Cheese Curd from 100 lbs. Milk.	FOOD COST OF PRODUCING 1 lb. Milk.	1 lb. Cream.	1 lb. Butter.	1 lb. Cheese.
		lbs.			lbs.	lbs.	lbs.	lbs.				
1 and 2..	Ordinary.	16¾	102	11.5	11⅞	28⅜	3⅜	12⅜	6 mills	3 cts.	13 cts.	7 cts.
2 and 3..	Bran	14¾	102	13·4	14 1/10	28	3⅛	10⅝	5 "	2 cts.	7 cts.	5 cts.
1 and 3..	Roots....	17	103·5	11·9	13½	27	3¼	14⅜	6 "	2½ cts.	9 cts.	4 cts.
2 and 3..	Ensilage .	15	103	15·0	15½	25½	4	15	9 "	3 cts.½	11 cts.	6 cts.
Mean..	.....	16	103	13	13⅛	27¼	3½	13¼	7½ m.	2⅞ cts.	10 cts.	5½ cts.

FOOD.—"Ordinary" consisted of 15 pounds hay, 24 pounds turnips, and 9 pounds bran, per head per day.
"Bran" consisted of 12 pounds hay and 15 pounds bran, per head per day.
"Roots" consisted of 15 pounds hay, 36 pounds turnips, and 6 pounds bran, per head per day.
"Ensilage" consisted of 18½ pounds oat fodder ensilage, 15½ pounds hay, 9 pounds bran, per head per day.

NOTE.—The value of skim milk is deducted, at half the cost of new milk, from cost of producing cream.

Taking this table as it stands, and assuming the figures to be a true representation of each subject, let us examine the results of each of the Foods that regulated the diets.

(*a*) FROM "ORDINARY" FOOD.

Nearly seventeen pounds of milk per cow per day, or seven quarts, by two milkings is a very ordinary quantity, even for November and December, on an average of cow conditions, and as we have to base comparisons upon what the "ordinary" did, it is well to remember the importance of this paragraph. The common Lactometer gave an average specific gravity of 102 at a temperature of 60° Fahr.; the extremes were 98 and 108. The produce of cream by volume or bulk, as set in large test tubes, shows 11½ per cent. to the milk, which, putting aside the Jersey, is a very high proportion, as, by reference to our 1882-83 work, elsewhere submitted in this report, 7 per cent. seems to be a fair average among many breeds. It is not necessarily the *bulk* of cream that gives value. Observe next that from 100 lbs. of this milk we obtain 11⅞ lbs. of cream, an almost exact correspondence, by the way, with its volume. Then again, when butter is wanted, only 3⅛ lbs., from the 100 lbs. of milk, and 28⅜ lbs. from the 100 lbs. of cream, is the average result. Our previous experiments gave no more from the milk, but a very much greater proportion from the cream. In regard to cheese, the amount of *dried curd* amounts to 12⅜ lbs. from the 100 lbs. of sweet milk, and I presume the quantity of ripened cheese would be five per cent. less; this is large—the average of Ontario factories being a little over 10 lbs.

These, then, are the indications of 56 days, by two sets of cows, that consumed daily per head, 13 lbs. hay, 24 lbs. turnips, and 9 lbs. of bran. With this compare,—

(*b*) FROM BRAN FEEDING.

By this is meant that wheat bran was given in such extra quantity as to regulate both quantity and feeding value, namely: 15 lbs. of bran, and 12 lbs. of hay per head per day.

From this unusually large allowance of bran we get two lbs. less milk per day, with an equal specific gravity to that of "ordinary" feeding. But the volame of cream is 2 per cent. more, and the weight of cream no less than nearly 3 per cent. greater than from the standard diet. On the other hand the butter was, for all practical purposes, equal, and the cheese 10⅛ lbs. from the 100 lbs. of milk—just a little over the average we are accustomed to look for, and therefore fully 1½ per cent. less than from our "ordinary" form of food.

(*c*) From Roots Regulating the Diet.

These were Swede turnips 36 lbs., and 15 lbs. hay, with 6 lbs. bran per cow per day. From these we have a somewhat higher specific gravity, and the best of the four in weight of milk, however, only ¼ lb. per day more than from "ordinary." The volume of cream is but slightly higher than our standard, and in weight comes between it and the bran, being 13⅛ lbs. from the 100 lbs. of milk. Roots have, as yet, given us the least quantity of butter, both per milk and cream, but the unusual quantity of 14⅔ lbs. of cheese per 100 of sweet milk.

(*d*) From Ensilaged Oat Fodder.

The oat fodder ensilage, as elsewhere described, was the regulating food in this diet, of which 18½ lbs., on an average, were consumed by each cow per day, along with 15½ lbs. hay, and 9 lbs. bran. From this the milk produced was 15 lbs., or nearly 2 lbs. less than from "ordinary" feeding, and an average specific gravity. The per cent. of cream, both by volume and weight is very much higher than any of the others—higher by 20 per cent. than the other three, and 13 per cent. over the mean of all. So, also, the 4 lbs. of butter from the 100 lbs. of *milk* is 23 per cent. greater than from others, but curiously enough, the proportion of butter from cream is considerably less than from others—eight per cent. less. We have most carefully checked all these figures, and so far as testing has gone, are satisfied of the facts. As if to make up for this, we obtain, on the other hand, the very large proportion of 15 lbs. of cheese curd from the 100 lbs. milk, although we may be told that fat has little to do with cheesy properties, which, however, is a mistake.

These, the result of 1265 observations, to date, must, to some extent, indicate the influence that food has upon milk, and while we look to June next to place us in a much better position to criticize, there need not be anything misleading in doing so now with the materials on hand, and it will serve to whet our appetites for the more reliable.

And first examine the condition of the butter—samples of which will be kept for examination at the Eastern and Western Dairymen's Association meetings in February next.

(*e*) The Butter Criticized.

That from roots is the highest coloured, just the colour liked by both the merchant and consumer, and as it has been coloured by the food, and not artificially, its genuineness stands the market, but its flavour, both by smell and taste is slightly, only slightly, high for some people. The butter from "Mixed" food is rich in colour, not much less than that from roots, but yet a tinge less yellow, having a fine even texture, and perhaps the most pleasant taste and smell of any. That from bran is third in colour, distinctly less than the mixture, but with all the flavour of first class, sound butter.

The butter from Ensilage has, for the second season, taken a very distinct position in our experience. I have to the best of my ability given the public a full account of everything connected with the experiments undertaken during the winter of 1882–83, as well as those now in progress. We have invited any form of inquiry and criticism on all hands, we have changed cows and food in every way likely to test thoroughly, and we have taken the preserved fodder, the milk and the butter, to public meetings and private parties. We have read and listened to much upon the properties of Ensilage during the past two years, but we have never seen the products nor specific details of thorough and impartial tests. Why do not Ensilage experts favour the public with such results? When they say that two sets of cows, one fed on Ensilage and the other on ordinary diet, gave results in favour of quality of milk, to the former, they do not say that the cows were

exchanged, or that they received no grain with the fodder; in all we have read considerable quantities of grain, in addition to bran, were allowed. Now this is not true first experimental work, for only such quantity should be mixed with the fodder as just to favour its consumption, but not to overrule its influence. We contend that in order to have the full effect of Ensilage, or any other food, it is absolutely necessary to free it as much as possible from any other food. We want the facts on the public table, with a full account of the proceedings, and until that is done we must doubt the reports.

The butter from Ensilaged food is again and again with us a most distinct pale, almost colourless, and semi-greasy appearance—altogether a thing by itself; such a colour as whatever its other properties, condemns it in the best markets. Why is this?—the same cows, same accommodation, management, similar season, time of churning, and in short having no different influence except food? Why is it? Corn fodder and oat fodder, green from the field, are first-class milk producers, and full of all good things for cow-life, but "Ensilage" them, make then sour, or tart by confinement in a pit—*and no one has ever yet been able to produce entirely sweet, or untainted green fodder by such a process*—and the influence upon the animal system is strikingly evident. The *warm* milk smells differently, the cream is not so rich, and is pale in colour, and the butter a very vinegar-washed looking substance that needs no expert to say so.

(*f*) Cost of Production by Food.

This branch of the enquiry is one of the most important, the least understood, and upon which so little information exists either in European or American experience. Of course this is no case of pasturing, but of housed winter conditions, and should therefore be valuable for creameries, city milkmen, and butter merchants,—not much to the cheese division, necessarily as a business, and meantime I shall only discuss the average of the three commoner kinds of food—leaving the Ensilage to further development.

The average cow, weighing 1075lbs consumed daily 44lbs of a variety of food that cost *on the market* eighteen cents, and cost the farmer eleven cents to produce them. In discussing profits we shall set aside at once the fact that in feeding hay and roots produced by himself, and bran he buys at eleven dollars per ton, the farmer makes an immediate profit on the former if he charges his cows at market rates. Let it be understood that these foods are to be charged at the price they cost the farmer to produce them: hay at one-fourth cent per pound, roots at one-twelfth cent and bran at one-half cent per pound.

Milk.

By what we call "ordinary feeding," it costs a little more to produce milk than by a large quantity of bran or of roots respectively; bran produced milk in somewhat less quantity, but did so cheaper than from "ordinary" food and a little less even than from turnips. Milk that costs by food alone in winter as much as an average of fully seven mills per pound, means nearly $1\frac{3}{4}$ cents per quart, so that the retailer at five cents per quart has some margin to meet expenses. As a whole, quantity and cost of production are in favour of Roots, but observe how uniform the cost is by the three forms of feeding.

Cream.

In this we have marked figures in favour of bran and roots—against "ordinary"—as much as forty per cent. Cream from food regulated by bran is, meantime, in our experience, cheaper than that from either Roots or "ordinary," owing to the larger proportion of cream obtained from the milk—that from roots is but a little more. It seems to be a fact that milk that costs by feed alone in winter $7\frac{1}{2}$ mills per pound, and that gives on an average, from three kinds of it, thirteen pounds of cream from every 100 pounds, wants $2\frac{3}{4}$ cents per pound for that cream, and in this calculation credit is allowed for the skimmed milk at one-half the cost of the sweet milk: were this not done the cost of the cream would be doubled. There is a hint in these figures for creameries that make butter in winter.

Butter.

In looking at the cost of producing butter in winter there are necessarily two methods: its relation to the milk, and its more direct position to cream. In receiving and paying for new milk at 7 or 8 mills per pound for the purpose of raising or removing cream to make butter, we should have to credit the butter with the value of the skim-milk, and as we have already referred to this system, it is only necessary to speak of butter as made by those who purchase the cream, or those who produce the milk. By "ordinary" feeding butter costs as high as thirteen cents per pound, seven cents from Roots, and nine cents from bran. It is not altogether the superior quality of the milk or cream that makes this difference in price, for the proportions of cream from milk, and of butter from cream are not very wide apart, but the cost of producing the cream that makes the butter regulates the price in these examples, and the general average of ten cents per pound as the *food cost* of producing one pound of butter in winter, will be an important item to compare with the experience of creameries.

Cheese.

While in these advance notes, there may not be much practical value to the professional cheese manufacturer in regard to the winter production of his subject, it is at any rate interesting to observe that it costs about 5½ cents per pound for the food that goes to sustain the cow that gives the milk, that makes the one pound of cheese, on an average—a cost probably four times greater than from pasture.

Throughout all these preliminary contests, it is of very considerable importance to find wheat bran holding a distinct place, and one in producing either milk, cream, butter, or cheese, that is twenty per cent cheaper than roots, and sixty per cent cheaper than by "ordinary" feeding.

We wait for the Midsummer Report with some interest.

(g) Chemical Composition and Nutritive Ratio of these Experimental Foods.

The following table shows the relative standing of our four milk rations to each other, and to the well known Wolff standard. This standard of Wolff can, of course, be made up of whatever materials are cheapest and suitable to the animal system, for the purpose in view, that is, in this case, the production of the greatest quantity of the best milk. It is a good guide, if not always a reliable one, and is based on what good pasture does. It seems then that we should aim at giving in winter the milch-cow per day that weighs 1000lbs., two and one-half pounds of albuminoids, nearly one-half pound of fat, twelve and one-half pounds of Carbohydrates, with twenty-four pounds of what is called dry matter; these give a nutritive ratio of 1 : 5.4, or one of Albumen to nearly five and one-half of Carbohydrates. The ratio we call "ordinary" is exactly Wolff's standard, and hence these experiments are based upon exact practical and scientific data, with the ordinary winter feeding materials of the country, hay, roots, and bran; these are our standard in this contest, and agreeing as it does with Wolff's, the comparisons are the more interesting and valuable.

"*Bran*" as a prominent part of a ration, gives a higher feeding ratio than the standard, and is the highest of any on this list, which is important to remember in connection with the results already obtained.

"*Roots*" on the other hand, are somewhat lower than the standard—as much as four per cent, though the figures seem to differ so little, and at the same time they represent the exact mean of the four rations.

"*Ensilage*"—and we are at present most interested in this material—is, if we are correct in placing it chemically—decidedly much lower in nutritive ratio, some twenty per cent lower than the standards. This is not owing to less fat, for it is next to bran in that respect, nor is it owing to the Albuminoids, which though low, are not so low as Roots, but it is owing to the smaller proportion of the Albuminoids to the Carbohydrates. I presume I am also correct in saying that the higher amount of dry matter is also evidence of a less rich diet in the case of the Ensilage.

CHEMICAL COMPOSITION AND NUTRITIVE RATIO OF FOOD EXPERIMENTED WITH.

—		Albuminoids. lbs.	Fat. lbs.	Carbhydrates. lbs.	Dry Matter. lbs.	Nutritive Ratio.
Wolff's standard for Cows weighing 1000 lbs.....		2.5	0.4	12.5	24.0	1:5.4
"Ordinary"	O. A. C.	2.17	.48	10.6	21.	1:5.4
"Bran"	Cows aver. 1075 lbs.	2.38	.63	10.4	22.	1:5.0
"Roots"	....	1.98	.39	10.1	22.	1:5.6
"Ensilage"	....	2.14	.49	12.5	27.	1:6.7
	Mean	2.17	.50	10.9	23.	1:5.6

5.—CONDUCT OF THE ONTARIO EXPERIMENTAL FARM SILOS, 1883-84.

As the second season of our experience in this very important enquiry—for it is but yet an enquiry all over the world—we determined to leave little unattempted in the way of economical experiment.

First of all, in August last we were employed two weeks in testing the keeping properties of various green fodders in a portable form. We considered it would be a good thing to be able to show that live stock could be fed on green fodder, either when importing from, or exporting to Britain, summer and winter. For this purpose we took ordinary sized oak barrels, as also larger barrels, such as are used for beer, and lastly a very large oak tun—capacity 60 cubic feet.

We found it very difficult to fill a barrel solidly round the edges with screw power, as the material tends toward the centre and leaves empty space adjoining the circumference, even when the fodder is in inch lengths. Thus we had to pack with the hand and lever power in addition to the screw. This was the first trial.

The second consisted in the same size of barrel, but fitted inside with a square box, so as to allow of the screw pressure being equal on all parts. This necessarily diminished the capacity for fodder, as vacancies remained between the box and the barrel. In order therefore to obtain an ordinary barrel capacity along with the inside box, a larger barrel was employed, as our third example; and, still further to insure success, the vacant spaces were packed very solidly with earth—earth also being placed beneath the box, and on top of fodder when finished; so that we had green fodder completely enclosed—first by an air-tight box, second, surrounded by a six-inch packing of loamy soil, and third, outside, by an air-tight, hardwood barrel.

In each of these three forms we used cut and un-cut fresh clover, rye grasses, and permanent pasture—very succulent, and none of them near maturity; the plants were so tender, that the strong screw abrased and discoloured them, as well as pressed out the natural sap to a considerable extent.

The fourth portable silo was the large tun referred to, which we placed in a corner of the cattle stable for convenience. It was fitted inside with a seven sided box, and filled with one ton of fodder—one-third green oats (similar to the largest silo yet to be described), and the remainder permanent pasture. Filling was done on the 3rd October, and was opened on the 29th December, having thus remained untouched for 86 days. The lid was covered with one foot of earth, and the screw kept taut every day. This material gave no indication of heating, and was perfectly cool when opened. The permanent pasture has a green-brown color, a strong sour taste and smell—a very heavy

putrid scent difficult to describe—and yet the fibre is sound even in the case of delicate clover. The whole body of the pasture was so full of sap as to be easily pressed out with the hand, when removed from the silo. The oat fodder, on the other hand, turns out sound, sweet, and as palatable as from the large silo. The pasture in the small barrels was similar in condition to that just described in the tun.

The character of our largest silo is explained herewith under the chapter, "Preserving Corn Fodder in a Common Root Cellar." It failed to preserve properly, by reason of irregular walls and insufficient loading—nothing else. This year the floor was cemented with a drainage to the doorway—not to the centre as in most other silos; the walls were also cemented, and in every respect made suitable for an air-tight covering, and easy access by door on level to cattle, at a cost of $28. All our corn fodder was destroyed by the severe frost in August, and had to be composted; fortunately, we had ten acres of late oats that were purposely made late for a trial of self-binders during the last week of September. This trial did not take place, and, it being impossible to mature the crop at that time of the year, we decided to ensilage it. Most of the field was green, both in stalks and leaves, while others were tinging with white and the leaves decaying, so that we selected the most unripe parts. The material may be said to have been on the mature side for this purpose, and yet we understand it is better to have it so than in the immature condition.

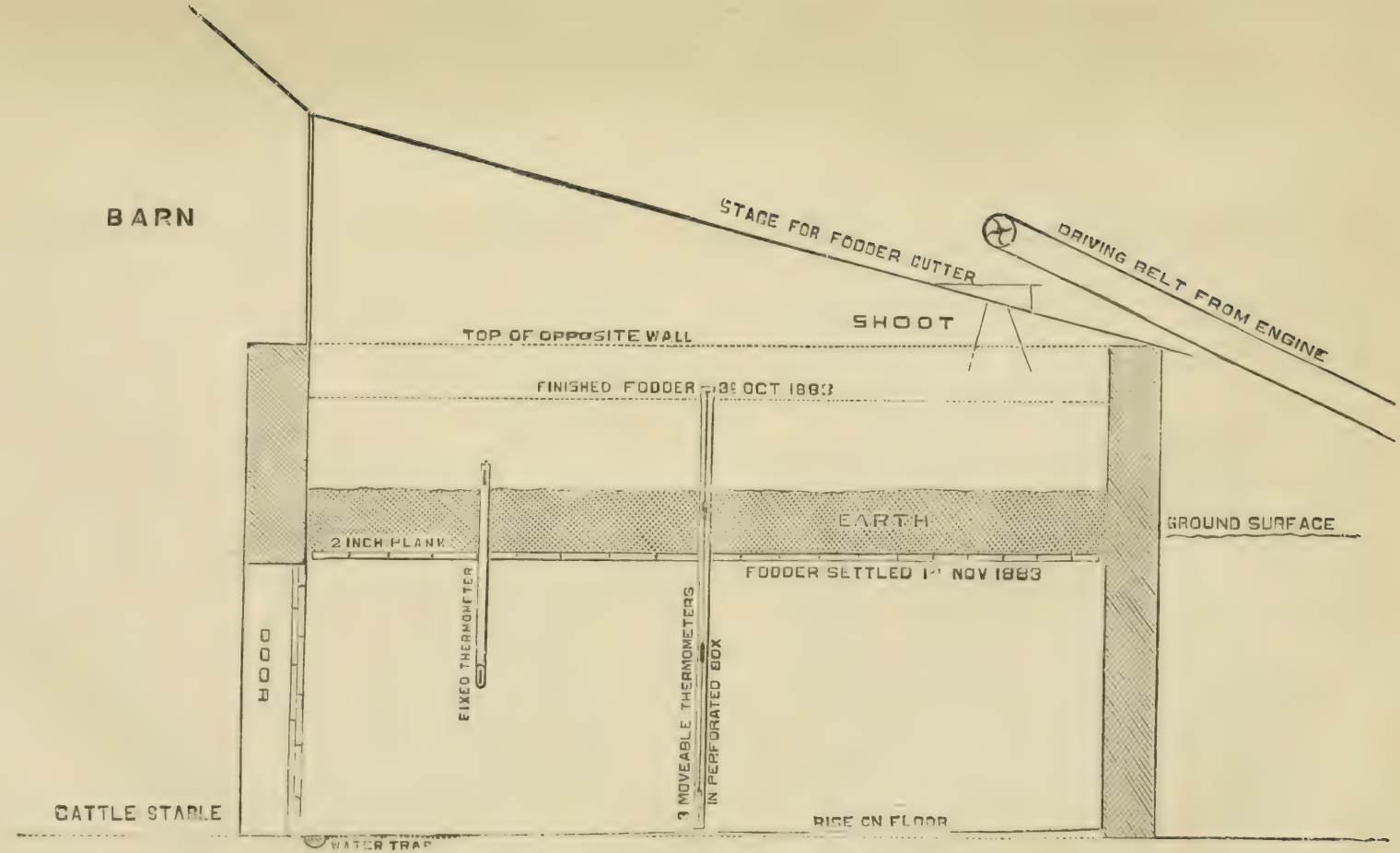
Mowing, hauling, cutting and packing commenced on the 1st, and was finished on 3rd October. In all these operations efficiency and economy were studied, and the bill, allowing full value for everything, stood as follows. Of course, the actual cash outlay was not half the sum given:

Wear and tear of engine	$3 00
Engine driver	4 50
Two teams (hauling from field, ¼ mile)	12 50
Mower and team (full time, one day)	3 00
Field loaders	7 00
Feeding straw-cutter (two men)	6 00
Men in silo (four)	10 00
Carpenter attendance	2 00
	———$48 00

Twenty-eight tons filled the pit to ten feet. It was at once covered with two-inch boards—averaging nine inches in width—and loaded with earth that gave 1,000 lbs. per square yard.

In order to ascertain the temperature of the material up to time of using, we placed a perforated wooden box, 4x4, in the centre of the silo, that rested on the floor and stood ten feet six inches in height, having a hinged lid as air-tight as possible. In this box three thermometers were attached to a sliding rod, the same length as the box—one at the bottom, one at what we calculated would be the settled centre, and the third near the top. This rod with its thermometers was easily removed when required for daily observation. In addition to this arrangement, and in order to check any improper effect of a closed box communicating with the open air, we placed a four feet ground thermometer into the ensilage by boring a hole after the mass was nearly settled down. As some may know, this thermometer records on the top from the open but shielded mercury at the bottom, without being removed. Its length enables us to place the mercury exactly in the centre of the mass, and yet to have twelve inches above the settled soil surface; the immediate contact of this thermometer with the fodder was considered rather more efficient than the box arrangement. The oat fodder did not settle down so rapidly as corn does, because the *hollow stems* resist and hold out longer; air is, therefore, more plentiful in such material, and takes longer to escape. It took twelve days to reach its final depth.

The position of the silo, with its appliances, will be easily understood from the following section:



SECTION OF ONTARIO EXPERIMENTAL FARM SILO.

We have arranged to feed milch cows and store cattle with this ensilage, commencing 1st January and continuing throughout the winter. Final results will consequently not be obtained until the issue of our Advance Report in June or July next, but, meantime, two very important facts are set at rest, and these I shall now sketch.

The silo was opened to-day (31st December, 1883), being eighty-nine days after finishing, or practically three months. It affords me great pleasure to record a most gratifying success. With the exception of three inches adjoining the door, the fodder is one body of sweet, well-coloured oat-stalks, leaves and heads. The greenness is more prominent immediately touching the planks; elsewhere the material has a brown, but not dark, tinge, very slightly spoiled by fermentation or other form of decay, and when taken out in its temperature of about 70° Fahr., smells actually sweet and tastes slightly salt (no salt was used in pitting), neither sour nor bitter, but exposure to the air very soon brings a distinct smell and taste. There are some spots that are not so sweet as others. The hollow stalks are all flattened and form a close mass with the leaves and heads. While it may be argued that we would have had a more juicy or succulent material had the oats been less matured, it is clearly obvious that the greater the maturity, consistent with *crisp greenness* at the time of pitting, the greater will be the success in holding freshness and sweetness all winter.

Then we are further enlightened, and somewhat surprised in addition, as regards the conduct of the silo under the temperature which we have been enabled to record so satisfactorily every day. Take the following abstract with its analysis:

Temperature of the Ontario Experimental Farm Silo, during three months ending 31st December, 1883.

T.—Top. C.—Centre. B.—Bottom.	1st Week.			2nd Week.			3rd Week.			4th Week.			5th Week.			6th Week.			7th Week.			Last Week.
	T.	C.	B.	T.	C.	B.	T.	C.	B.	T.	C.	B.	T.	C.	B.	T.	C.	B.	T.	C.	B.	
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	
Highest	71	92	65	67	91	65	62	88	64	59	93	68	64	89	66	56	87	67	56	84	66	Centre 73°
Lowest	63	89	64	53	86	63	53	86	63	58	92	67	57	79	64	46	81	64	54	78	63	
Mean	67	91	65	51	88	64	55	87	63	58	92	67	60	84	60	52	84	62	55	81	64	
Mean outside...	52°			40°			42°			41°			39°			25°			43°			26°

Average of Top for period ..... 58°
Average of Centre for period .... 87° } 68° general mean.
Average of Bottom for period..... ..... 61°

We have in this table, and with the facts already given, undoubted evidence that a high temperature does not destroy the green moist material in a silo; that the average temperature of 87° Fahr. continued for three months, and that much less, would spoil fodder under other conditions is well known, both in hay-making, shocking of grain in the field, and manure heaps, and why it does not do so in *confinement* is the question in the present issue. That a temperature ranging from 46° to 93° existed in a mass of green fodder during three months of winter is evidence of several things which neither the farmer nor the chemist can well explain: Did it do no harm because of its stationary condition; was the ventilation insufficient to move enclosed atmospheric particles that we know is necessary to bring about decay in ordinary open condition with the like material; has the gaseous state of the enclosed mass a preserving instead of a destroying property; yet why was there a certain amount of destruction as evidenced by the brownish colour, and what gave the occasional acidity irregularly throughout the mass?

From week to week there was no particular diminution, or increase even, of temperature on an average from top to bottom. The mean temperature of the first week was 74° all throughout, and it appears to have settled down to a normal of 68° during the second week, for, observe that from this week onwards the mean of the weeks is exactly 68°. All this, remember, independently of the outside variations of temperature. Then there is other evidence given by the temperature that the silo was sealed up and had practically no ventilation; heat did not rise from the centre to the top, nor was it distributed from the centre to the bottom. The ruling temperature of the centre was 87°, the top 61°, and the bottom 58°.

We look with considerable interest to the produce of milk, butter, cheese and beef from the feeding of this Oat Ensilage, now under experiment at our station.

The butter will be exhibited at the February meetings of the Eastern and Western Dairymen's Associations.

6.—WOOL AS A BI-ANNUAL CROP, AND THE CLIPPING OF LAMBS.

The knowledge of wool is not so full any where as it should be. England still remains indifferent in regard to this product within her own bounds, and while all other civilized countries have paid more attention to wool than mutton, this very prominence has made men careless about its better cultivation. There is no doubt that every such free offering is looked upon as a matter of course—needing little or no attention, and handled practically as if it were unsusceptible of any improvement in its growth and harvesting.

There is one thing in connection with this subject that I think is well worth careful consideration, and that is, the clipping of lambs once, and of all other sheep *twice* a year. The practice is not unknown in several parts of the world, where climatic conditions are thought to be most favourable, but I am not aware of any practical suggestions, and have not heard of any actual experiments in the Northern States or Canada, where, of course, seasons are very much the reverse of the others referred to. Before submitting the experiments made on this farm during the past summer with several sheep, it is best to give the theoretical and practical arguments in favour of the proposal.

Sheep in very large numbers together, for cheap production, can be maintained only when frost is but a friendly visitor to check more abundant vegetation, eradicate diseases and freshen animal life. The Middle States, California, Australia, and parts of Europe are examples of such winters, where, nevertheless, diseases are most abundant as against much more severe winters, such as occur in the Northern States and Canada. The former is the natural home, the latter is very much the unnatural home of sheep. When nature is so propitious to vegetation and sheep life, the prevalence of disease is due as much to mismanagement, or to a superabundance of good things, and, in any case as the animals are comparatively in a state of nature, being neither subject to extremes of climate, nor to high pressure in feeding, it is found that experience

agrees with nature in offering, and taking one crop of wool once a year only, partly because of nature desiring relief, and partly as brought about by the habit of shearing. Wool would come off if not removed by man. Were wool clipped twice in Britain, for example, the animals would suffer severely in the early autumn by wet and chills, and the second growth would not be sufficiently vigorous to defend from the winters, however mild.

On the other hand when sheep have six months of summer and six of winter, with the unavoidable artifiical conditions of the latter season, the wool is a very different crop. As this fact may be doubted by some, it is desirable to explain that sheep in the Northern States and Canada, when well fed and sheltered, grow as much weight of wool as during the previous summer. During the great heat wool lengthens and takes strength, but in the extreme cold the field sends up more plants, and finer, the yolk increases, and density, lustre, and soundness increase as well, so that ere the month of March, when the mean temperature is really high, the well-fed animal suffers considerably, the whole surface fleece is almost continuously wet by arrested vapour from the rich fat soil that supports it. Under such conditious the "best of everything" is not obtained, the mutton suffers and the wool is not benefited. In a word, our winters with their good feeding, and summers with their natural pressure, can grow two crops of wool with benefit to the animals and good profit to the owners.

But without example, precept is not so valuable, and accordingly I have pleasure in reporting what we did during the past season.

On an average, our lambs come in the middle of March and are weaned in the middle of July, ordinary clipping about the middle of May.

On 12th July we clipped a Shrops. grade wether lamb that was dropped 12th March, and secured 3 lbs of washed wool. (Ear label 343.)

On same date clipped a Shrops. grade shearling fattening wether that was formerly shorn on 1st April of the same year; first clip weighed nine pounds, second clip four pounds, both washed; (ear label 772).

We took the Shrops. grade as best to represent both the long and the short classes of wool, as either extreme might influence for or against.

Thinking that a particular season—a moist one—might influence a later clip, we again, on the 16th August shore two lambs, Cotswold grade ram (ear label 529), and a South Down grade wether (ear label 341), each gave exactly three and three-quarter pounds of washed wool.

The new crop of wool, on lambs and the shearling, did not, as under any circumstance it never does, appear to make much progress for three weeks, but the pile thickened and grew in strength so much that when dirt made colour similar to the other sheep, the visiting eye could not detect the difference between the shorn and unshorn lambs, nor between the once shorn and the twice shorn wethers. Not only so, but we kept impartial note, taking from July to October, and found a most marked better progress in the growth and vigour of the animals themselves.

When winter began to speak on 31st October our notes were:

Ear No. 343, wool, two and one-half inches on average, dense, and the animal well covered all over.

Ear No. 772, wool, two and one-half inches, somewhat open in comparison with 343, but well covered.

Ear No. 529, wool two and one-half inches, and a good crop of its kind.

Ear No. 341, wool average two inches, a beautiful close pile.

The second year students were with me at this examination, many of whom are farmers' sons, and they expressed surprise at the uniformly close coat, that on an average was as well able to protect as others of the flock. Not the least reflection was left on our minds as to any unpreparedness for winter, and to-day (19th January), the animals are as comfortable and doing as well as, if not better than, the others. Thus much for the present.

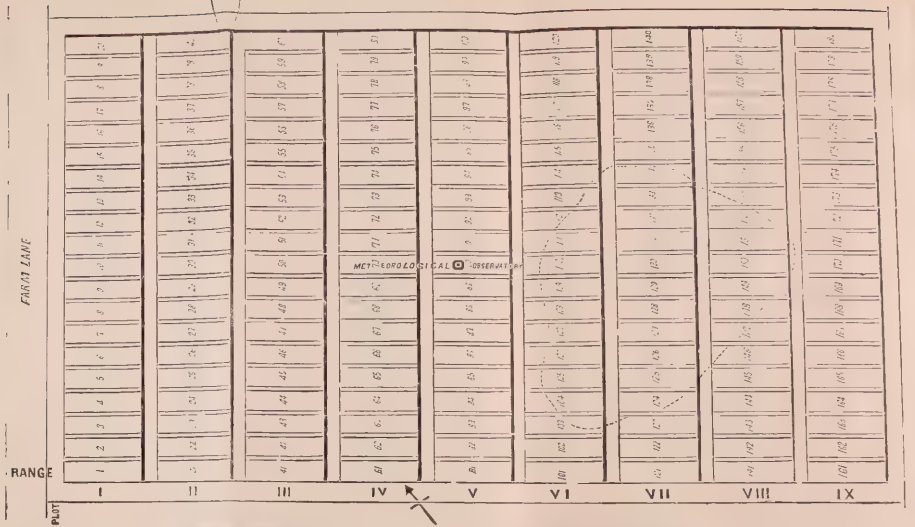
What does it mean financially?—for while it is yet too early to state anything definite, it is not difficult to prejudge pretty closely.

Take a flock of 1000 ewes of medium wool, under management that always does best—

ONTARIO EXPERIMENTAL FARM.

EXPERIMENTAL FIELD PLOTS.

(Field 14 of Farm.)



Area of each Plot = $\frac{1}{20}$ of an acre

Width of Range Roads—20 feet.

Width of Plot Paths—4½ feet.

SOILS { Ranges I to V—Clay Loam. Ranges VI to IX—Gravelly Loam. Within dotted line—Vegetable Mould.

SCALE—One inch to 132 feet.

liberal but not profuse—one-half of the previous year's lambs having been kept to fatten, as shearlings.

	Present System.	Proposed Plan.
Clip of 1000 common Canadian Ewes, 6 lbs., unwashed, at 15 cents, 15th April	$900 00	$900 00
Clip of 500 Shearlings, 8 lbs., @ 17 cents, "	680 00	680 00
Second clip of 1000 ewes, 3 lbs., @ 17 cents		510 00
Second clip of 500 shearlings, 4 lbs., @ 18 cents		360 00
Clip of 1200 lambs, 3 lbs., @ 18 cents		648 00
Per annum	$1,580	$3,098

Of course against the $3,098 would stand expense of clipping, and the following memoranda would also hold good :

1. We would secure eighty per cent. more wool.
2. Sheep would be more healthy and attain greater weight in the same time.
3. The wool would suit the average manufacture better, bring more money per pound, and improve in texture and weight.
4. The sheep would consume less food in winter.
5. Lambs wool fetches more money per pound.
6. And the greater care required would necessitate an improved sheep husbandry.

I think the Experimental Station should continue the enquiry.

1.—OPENING OF THE NEW EXPERIMENTAL FIELD PLOTS.

I believe it to be the wish of all interested, that Ontario should possess the most complete and practically valuable experimental station, it is possible to command in the light of these days. What we have done, and are still prosecuting with animals is elsewhere submitted, and what we have in view to do with *plants* is the subject of this chapter.

Field fourteen of the farm has been chosen as the extended plots, for the following reasons :—It is the most uniform in exposure and aspect of any convenient to the College ; it is one of our largest fields, almost twenty-four acres, has been recently drained, and possesses soil of three different characters as shown on the accompanying plan.

In preparation for 1882–83 work, this field was thoroughly fallowed by four ploughings during the summer of 1882 the removal of any obstacles to the plough, the levelling of parts adjoining fences, and the digging of all the ground close to the fences where the plough could not reach. On the north-east side a row of maples has been planted ; horse chestnut on the south-east end ; mountain ash on the south side ; and European linden on the north-west end, with a view to a certain amount of shelter and ornament.

In considering the sub-division of this field into plots suitable for any purpose, we saw no reason to depart from our old area of *one-tenth of an acre*, as to which see my report of 1876. This, of course, implies an easy making of a fifth, or a twentieth, or even a fortieth of an acre, if necessary. The field has been divided into nine ranges, containing each twenty plots, so that there are actually as many as *one hundred and eighty plots*.

Each range is separated by a twenty feet road, and between each plot there is a four and one half feet path. Thus, all over, we think we are up to times in regard to area, form, and position of plots. The form of 132 feet by thirty-three feet lying north-west and south-east is one well adapted to receive the full measure of sunshine—beginning with the morning broadside, the noonday sweep, and the evening touch, each in its

largest measure. There is a road over twenty feet in width round the field, between fence and plots. One objection to this form of plot is the greater length of boundary, as against a square—364 feet and 264 feet. It is a well known fact in practice that in any field, plot or bed, the *outside* plants are stronger, by reason of the better light, air, and sunshine ; so then, the greater the boundary line the heavier the crop, proportionately to inside area ; this is so plainly a fact in experimental work—often overlooked however —that the difference of one hundred feet to a small area, such as one-tenth of an acre, might overbalance a fine point between two fertilizers, and certainly, as one hundred feet is to one-tenth there must be at least 1,000 feet to an acre, and accordingly multiplying to a very serious extent—for experimental accurateness.

There are three distinct classes of soil in our new experimental field ; from range two to range five, inclusive, it is a clay loam of average texture, with a yellowish subsoil of a sandy character ; the remainder of the field, with the exception of the swampy part—is of a lighter, sharper class, which we call a gravelly loam ; and about two and one-half acres, as indicated by the dotted line on plan, are a swamp that has been drained, burned, thoroughly cultivated by ploughing and harrowing, cleaned of all roughness, and is now a spot of virgin soil—never having been cropped—of the vegetable mould type.

Such is our new experimental field proper, on which, in future years, may depend much of the status of Canadian Agriculture.

The cropping of these plots has been a matter of some study—just what to do in connection with the existing, or the probable future, requirements of Ontario's rural economy. Of course our past experience has indicated several things, and by reference to what Europe and the United States are doing in the same line, we have concluded upon the following plan :—

i.—Soils.

Two plots to be divided into eight parts, each to be made up to the depth of two feet with the following soils : (1) Heavy clay ; (2) clay loam , (3) loam ; (4) sandy loam ; (5) swamp ; (6) gravelly ; (7) marly ; (8) sand. These to test manures under the like conditions of management and climate—the physical conditions of soils affecting manures very differently.

ii.—Cultivation.

1. Rotations, three sets	One plot to each.
2. Cultivating cereals, say wheat	1 plot.
3. Non-cultivation,	1 "
4. Subsoiling,	1 "
5. Drainage, effects of rain in withdrawing manures	2 "

iii.—Seeding.

1. Thick seeding	1 plot.
2. Thin "	1 "
3. Drilling "	1 "
4. Broadcast "	1 "
5. Deep "	1 "
6. Shallow "	1 "

iv.—Cropping.

1. Winter Wheats, varieties	10 plots.
2. Spring Wheats, "	10 "
3. Oats "	10 "
4. Barley "	10 "
5. Rye "	2 "
6. Peas "	3 "
7. Roots—mangolds, turnips, carrots—varieties	11 "
8. Potatoes, varieties	5 "

9. Corn, varieties	4	plots.
10. Grasses and clovers, separately	20	"
11. Green Fodders	6	"
12. Permanent pastures, various mixtures	3	"
13. Sundry crops	2	"
14. Sugar beet	1	"
15. Sugar cane	2	"
16. Crop after crop of wheat upon virgin soil (Clay loam)	2	"

v. Unmanured Plots.

Unmanured plots	4	

vi.—Manuring.

1. Farm-yard manure, best management of, from uncovered court	1	plot.
2. Farm-yard manure from covered court	1	"
3. Farm-yard manure from poorly fed animals	1	"
4. Farm-yard manure from well fed animals	1	"
5. Fertilizing by sheep (diff. soils)	2	"
6. Farm yard liquid (diff. soils)	2	"
7. Clean straw, rotting on surface	1	"
8. Clean straw, ploughed under	1	"
9. Compost (diff. soils)	2	"
10. Clover (diff. soils)	2	"
11. Bare fallow (diff. soils)	2	"
12. Sewage from College (diff. soils)	2	"
13. Marl (old and new)	2	"
14. Phosphate (apatite)	1	"
15. Superphosphate	1	"
16. Bones, fine ground	1	"
17. Bone superphosphate	1	"
18. Gypsum	1	"
19. Leached ashes	1	"
20. Lime (var. soils)	1	"
21. Salt (var. soils)	2	"
22. Mixtures of several manures	5	"
23. Various *quantities* of several manures	5	"
24. *Special* manures	3	"
25. Fall *vs.* spring manuring	4	"
26. Manures applied at various stages of growth, same season.	2	"
27. Duplications of several	5	"
28. Nitrate of soda		

vii.—Modes of preventing and curing diseases of farm crops.

viii.—Special potash and nitrogen experiments in co-operation with the United States series.

Dr. Hare, our chemist, is now associated with me in the management of this department, and we are still in possession of the valuable services of Mr. Shuttleworth, as immediate Superintendent of all operations connected therewith.

Before reporting upon the cropping of 1883, I beg to submit what is being done in providing scientific appliances for this department.

As we could no longer delay the thorough analysis of any form of materials, apparatus for this purpose have been obtained, and are in possession of Dr. Hare, who will report on what he has already done.

2.—APPLIANCES FOR EXPERIMENTAL PLOTS.

Plot 90 has been set aside for the purposes named on plan herewith. The *meteorological* frame contains the ordinary instruments as recognized by the Toronto Observatory, to which we are associated and make returns.

We have nine *ground thermometers* registering the temperature of as many different depths, ranging from two inches to four feet beneath the surface.

There are six lycimeters, or *Drainage Cylinders*. These are the ten-thousandth of an acre in area and three feet deep, with outlets into the rain gauge cellar. The object with them is to ascertain the amount of evaporation and drainage from different soils, and from like soils under different forms of cropping. This is specially necessary in our conditions of great special falls of rain, that wash so much natural and special manures beyond the reach of ordinary cultivated plants. The analysis of any drainage from these lycimeters will be the duty of the chemist. "Receiving cylinders" to each will be placed in the cellar named, and all necessary minor appliances made good.

The *great rain gauge* occupies the centre of the plot, and is almost an exact copy of that at Rothamstead, England. The receiving area is the one-thousandth of an acre, and in all its "fixings" and detail build is well worth the study of every scientist. No pains have been spared to make this gauge a very complete one—its stone walls and steps, cemented floor, four water cylinders, registering the *one-thousandth of an inch* of rain fall—a quantity so small as to be incapable of record except by such an application of cylinders, but here so distinct as to be easy of observation with the naked eye; the framing of the surface receiver, in wood, lead, and glass and generally the whole simplicity and efficiency of this important rain measurer is a matter of some satisfaction. It is something to say that it is the second of its kind in existence—Sir J. B. Lawes having set the example.

Thus equipped, our experimental field plots are now ready for work.

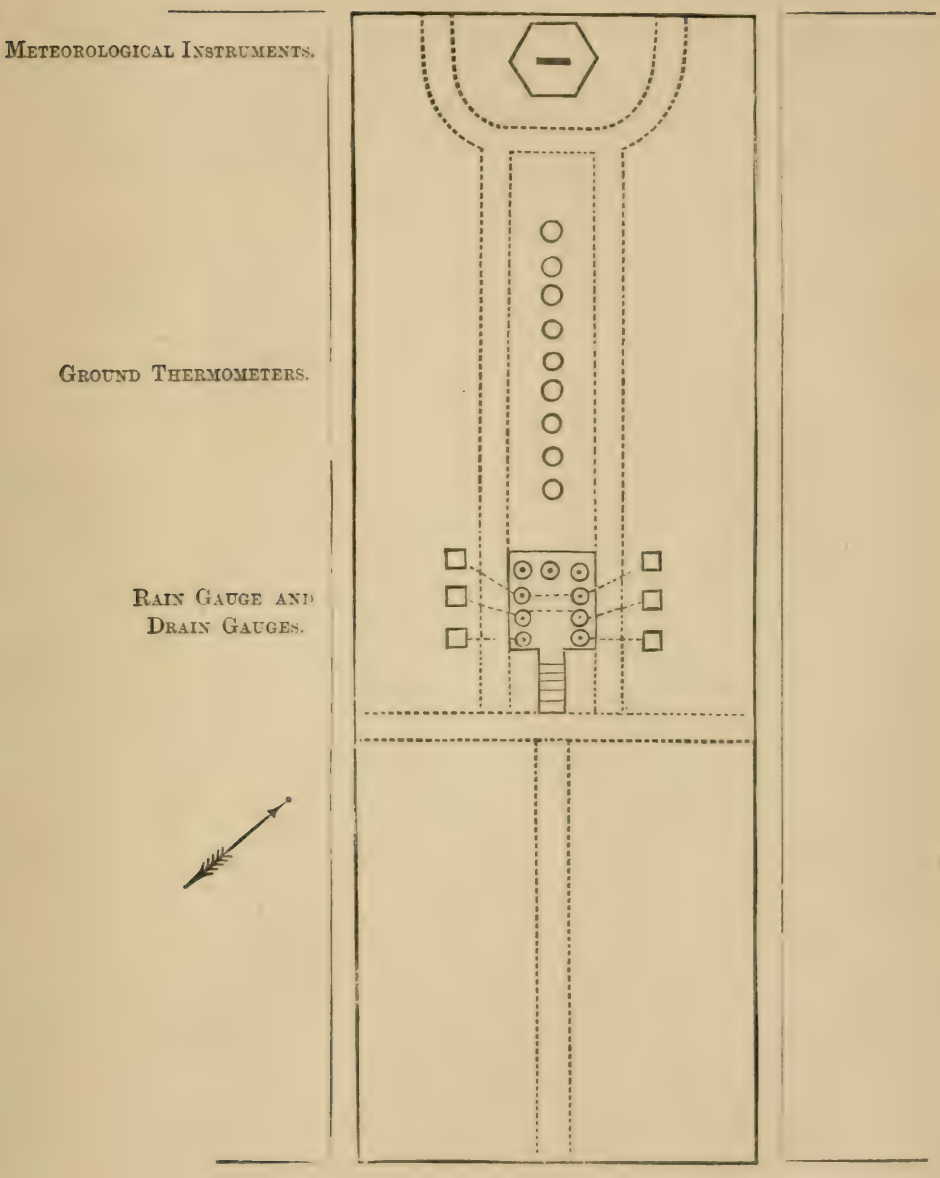
The cropping of 1883 was as follows:—

3.—CROPPING OF EXPERIMENTAL PLOTS.

(*a*) Winter Wheats in Opposition.

Plot.	Variety.
1	Democrat.
2	Egyptian.
3	Lancaster, or Boyer.
4	Roger.
5	White Mountain.
6	No. 9, O. A. C.
7	No. 8, O. A. C.
8	Washington Clawson.
9	Silver Chaff.
10	Fluke.
11	Finlay.
12	Fultz.
13	No. 3, O. A. C.
14	Rust Proof.
15	Deihl.
16	Clawson, ordinary cultivation.
17	Clawson, manure ploughed under.
18	Clawson, carbonized saw dust as a top dressing.
19	Clawson, without manure
20	Clawson, manure ploughed under.

The sowing of these winter wheats was undertaken from the 19th to the 21st of September, 1882. The ground was summer fallowed with four ploughings and harrow-



EXPERIMENTAL PLOT APPLIANCES.

ings, and gave a very mellow open seed-bed. Braiding was not very vigorous. There was plenty of snow cover up to February, when rain made a hard packed crust. In April and May many parts were water-lodged and covered with ice. We think there was no actual smothering of the plants during winter, but the cold spring, with stagnant water did much harm. On 30th of April all the plots looked patchy, but ere the 25th May the remaining plants had made good progress. Up to the 23rd June growth was very vigorous, under an unusual amount of moisture and the usual high temperature. By 10th of July rust on leaves and straw was very profuse on every one of the kinds, and three days afterwards a shower washed off so much of the rust as to color the ground distinctly red. The Deihl was a complete failure from the cause named and its more tender character for our position.

FALL WHEAT, PER ACRE.

PLOT.	KIND.	GRAIN.	STRAW.
		Bushels.	Pounds.
1	Democrat	8¼	3150
2	Egyptian	8¾	3840
3	Lancaster	9	3730
4	Rogers	8⅜	3530
5	White Mountain	8½	3420
6	O. A. C. No. 9	14½	2580
8	Silver Chaff	8½	3040
10	Fluke	7½	2400
12	Fultz	5	1640
13	O. A. C. No. 3	4⅞	2880
14	Rust Proof	4⅜	1260
15	Diehl	Failure	Failure
16	Clawson	10¾	2960
17	"	16⅜	3580
18	"	9¼	2370
19	"	7½	2090

(*b*) FERTILIZERS ON GRAIN.

Plots 21 to 60.

These have been set aside to test the following Fertilizers :

		lbs.	
21	Nitrate of soda	300	per acre.
	Mineral superphosphate	400	
	Muriate of potash	200	
22	Nitrate of soda	300	per acre.
	Mineral superphosphate	400	
	Muriate of potash	135	
23	Nitrate of soda	300	per acre.
	Mineral superphosphate	400	
	Muriate of potash	70	
24	Mineral superphosphate	400	per acre.
	Muriate of potash	135	
	Dried blood	660	
25	Farm yard manure	15 tons	per acre.

		lbs.	
26	Mineral superphosphate	400	per acre.
	Muriate of potash	135	
	Dried blood	440	
27	Mineral superphosphate	400	per acre.
	Muriate of potash	135	
	Dried blood	220	
28	Mineral superphosphate	400	per acre.
	Muriate of potash	135	
	Sulphate of ammonia	340	
29	Mineral superphosphate	400	per acre.
	Muriate of potash	135	
	Sulphate of ammonia	225	
30	Without manure		
31	Mineral superphosphate	400	per acre.
	Muriate of potash	135	
	Sulphate of ammonia	115	
32	Mineral superphosphate	400	per acre.
	Muriate of potash	135	
	Nitrate of soda	450	
33	Mineral superphosphate	400	per acre.
	Muriate of potash	135	
	Nitrate of soda	300	
34	Mineral superphosphate	400	per acre.
	Muriate of potash	135	
	Nitrate of soda	150	
35	Mineral superphosphate	400	per acre.
	Muriate of potash	135	
36	Nitrate of soda	300	per acre.
	Muriate of potash	135	
37	Nitrate of soda	300	per acre.
	Mineral superphosphate	400	
38	Muriate of potash	135	per acre.
39	Mineral superphosphate	400	per acre.
40	Nitrate of soda	300	per acre.
41	"Nitrogen mixture," equal parts nitrate of soda, sulphate of ammonia, and dried blood	300	per acre.
42	Mineral superphosphate	400	per acre.
43	Muriate of potash	135	per acre.
44	"Nitrogen mixture"	300	per acre.
	Superphosphate	400	
45	Without manure		
46	Muriate of potash	135	per acre.
	Superphosphate	400	

		lbs.	
47	"Nitrogen mixture"	300	per acre.
	Muriate of potash	135	
48	"Nitrogen mixture"	300	per acre.
	Muriate of potash	135	
	Superphosphate, dissolved bone black	200	
49	"Nitrogen mixture"	300	per acre.
	Muriate of potash	135	
	Superphosphate	400	
50	Farm yard manure	15	tons per acre.
51	"Nitrogen mixture"	300	per acre.
	Muriate of potash	135	
	Superphosphate	600	
52	"Nitrogen mixture"	300	per acre.
	Muriate of potash	135	
	Precipitated phosphate	200	
53	"Nitrogen mixture"	300	per acre.
	Muriate of potash	135	
	Precipitated phosphate	400	
54	"Nitrogen mixture"	300	per acre.
	Muriate of potash	135	
	Precipitated phosphate	600	
55	"Nitrogen mixture"	300	per acre.
	Muriate of potash	135	
	Bone dust	200	
56	"Nitrogen mixture"	300	per acre.
	Muriate of potash	135	
	Bone dust	400	
57	"Nitrogen mixture"	300	per acre.
	Muriate of potash	135	
	Bone dust	600	
58	"Nitrogen mixture"	300	per acre.
	Muriate of potash	135	
	Sulphate of lime	75	
59	"Nitrogen mixture"	300	per acre.
	Muriate of potash	135	
	Sulphate of lime	150	
60	"Nitrogen mixture"	300	per acre.
	Muriate of potash	135	
	Sulphate of lime	225	

PRODUCE PER ACRE.

PLOT.	See above for Manures.	GRAIN.	STRAW.	WEIGHT PER BUSHEL.	—
21		23½	5312	54½	
22		17	4777	55	
23		17⅜	4362	54⅜	
24		17¼	4362	54½	
25	Farm Yard Manure	16¼	4720	53	
26		16⅜	4302	54	
27		16¾	4007	55	
28		15½	2987	54	
29		15⅕	3532	55	
30	Without Manure	8¼	2457	51	Damaged by wet.
31		11⅕	3020	54⅛	
32		....	....	....	
33		....	....	....	
34		....	....	....	
35		8½	2237	52⅜	
36		15½	3377	51	
37		12¾	3182	55	
38		11⅛	2870	47⅓	
39		11	2762	54½	
40		9⅛	2512	50	
41		18½	4085	53	
42		19½	3787	54½	
43		18	4010	50	
44		16¼	3697	52½	
45	Without Manure	15⅕	3422	53	
46		22½	4785	55	
47		19⅜	4345	53½	
48		17¼	4072	52½	
49		20½	3925	56	
50	Farm Yard Mannre	22	4075	54⅛	
51		17⅜	3260	55	
52		17½	3522	55⅓	Damaged by wet.
53		19	3502	55½	
54		25	4405	55½	
55		19⅓	3492	54⅛	
56		17	3360	51	
57		15¼	3142	49½	
58		17¼	3182	58	
59		16¾	3170	50	
60		17½	3297	52	
	Means	17	3665	53	

Sown, May 1st and 2nd; Fertilizers applied, May 3rd; Headed, July 12th, on average; Harvested, on average.

The crop was White Russian Spring Wheat, seeded by drill at the rate of six pecks or 90 lbs. per acre. Vegetation came above ground on 15th of May on an average.

I do not know what our Professor of Chemistry will say to the Province on the whole question of this first year's cropping of such an important series of manural tests, but from the stand-point of a practical farmer, I am of opinion that any comparative note-making has been swept away from us by the very unusual amount of rainfall. The continuous drenching, flooding, and even the presence of stagnant water on several plots, must have largely counteracted the efforts of, at least, the more active forms of these special fertilizers. How much has been carried off by surface washings, how much beyond the reach of cultivated plants, how much has been assimilated by the first crop, and how much still remains in the root area of the soil will never be known.

In leaving the scientific bearings of this to our chemist, I desire to draw attention to the following facts, as they would strike any reasoning, accurate, impartial and practical critic:

1. Soil that gave twelve bushels of spring wheat per acre, *without manure*, (plots 30 and 45) cannot have been in poor condition, and plot 30 was badly damaged by the wet season.

2. Soil that gave an average of 17 bushels of spring wheat per acre, by the application of 650 lbs. per acre on an average, of many forms of fertilizers, could not have been largely benefited by them.

3. Soil that produced 19¼ bushels of spring wheat per acre, with the help of Farmyard manure (plots 25 and 50)—or two bushels more than from special manuring—must have acted differently, or have been more suitable than the specials, either through weather or other influences.

4. Soil that did not respond one bit to 400 lbs. of Mineral Superphosphate, 135 lbs. Muriate of Potash, and 660 lbs. of dried blood per acre (plot 24), under all the previous favourable conditions, must have a queer story to unearth as regards both air food, and soil food.

5. Soil that gave but two bushels less than the average, by the minimum application of special fertilizers, (plots 38 and 43) is evidence of its own well-doing or of the poor doing of others.

6. Soil that seems to have responded to precipitated phosphate (plot 54) may have been influenced by particularly favourable physical conditions in itself, and perhaps even good previous chemical conditions.

7. Grain that should weigh 60 and only weighs 53 lbs. per bushel, must have come through unfavorable filling and maturity. The heaviest weighing of plot 58 does not appear to have been from special manuring; the unmanured grain weighs equal to the whole average.

8. Plants that usually give 4000 lbs. straw, and that on a particular occasion gave 3665, per acre, cannot have had unfavorable straw conditions, either in soil or climate.

These questioning notes are meant to show how much the value of fertilizers is subject to physical conditions of soil and climate, and in this example to climate particularly, and how much more light is needed, both by chemist and farmer.

(*c*) Spring Wheats in Opposition.

In this we are but keeping the enquiry open until something substantial is done in securing new kinds from Europe.

VARIETY.	Plot.	Grain—Bushels.	Straw—Lbs.	
Arnautka	66	18⅛	3865	Bearded.
White Fife	67	13½	2915	Bald.
Club	68	20½	1855	Bald.
Black Sea	69	20⅛	1140	Bearded.
Red Fern	70	10	2750	Bearded.
Mean		16½	2505	

The Black Seed was obtained from Wm. Rennie, Toronto; it has a somewhat fine head and weak straw, but, it is worthy of note that with the Club it has given a very much larger proportion of grain, per acre, as well as per straw.

(*d*) Barley.

PER ACRE.

VARIETY.	Plot.	Grain—Bushels.	Straw—Lbs.	
Canadian	71	37	3220	Six rowed.
Russian	72	33⅜	3160	Six rowed.
Black	73.141	78⅓	8070	Six rowed.
Chevalier	74	33⅜	3820	Two rowed.
"Spring"	75	43⅜	4560	Six rowed.
Probestier	142	45½	5320	Two rowed.
Potter's Prize	143	35⅓	4100	Two rowed.
Hallet's Pedigree	144	32	4210	Two rowed.
Hulless	145	24⅜	4110	Two rowed.
Mean		40½	4507	

Seeding 5 pecks or 70 lbs. per acre, on 7th "May ; headed" 6th July, Harvesting 16th August. The Canadian has short straw comparatively, that lodged this year, but did not break down. The Russian has a short head and weak straw ; the Black, which is hulless, has short thick straw, as well as a short plump head. With all its virtues, newly got from England, the Chevalier, this season, has been on the delicate side. The two rowed Probestier has very long, strong straw, and for the season must have produced less grain than drier conditions would have done.

(*e*) Thick and Thin Seeding.—plot 77.

Spring Wheat.

Though a very simple, this will be an important experiment if prosecuted through a variety of conditions, and the 1883 growth is suggestive enough, as follows: The quantities used were 4 pecks, and 7 pecks, respectively.

PER ACRE.

——	Grain.	Straw.	Per cent. of Grain.
Thin Seeding	11⅛	2730	19
Thick "	12½	2885	22

(*f*) Deep versus Shallow Seeding.

(plot 80.)

Spring Wheat sown 8th May, headed 22nd July, and harvested 28th August. Deep seeding by drill was four inches, shallow 1½ inch. On 11th July the shallow seeding was strongest, as it has been all along, though the difference in brairding was only three days. Result as follows:

——	Grain, Bushels.	Straw, Lbs.
Deep	11⅔	2,820
Shallow	12⅓	2,560

So many conditions influence this kind of enquiry that it will be well to accumulate more facts before making comments.

(*g*) Permanent Pasture.

(Plots.)

A prominent Senator of the Dominion of Canada has placed on record with the management at Guelph, that what has already been done by the Experimental Department in placing reliable facts before the country with reference to permanent pasture goes a long way to meet the whole expense of the Institution. He is setting the example on a large scale and has succeeded much beyond his expectations.

In the establishment of these new plots we have given considerable space to a mixture of grasses and clover. The best mixture per acre recommended according to past experience is

Timothy grass		7 lbs.
Orchard "		4 "
Italian Rye grass		2 "
Perennial Rye "		2 "
Tall Oat "		2 "
Red Top "		2 "
Meadow Fescue grass		3 "
Creeping Bent "		1 "
Kentucky Blue "		2 "
Grasses		25 lbs.
Lucerne Clover	4 lbs.	
White "	3	
Alsyke "	1	
Red "	1	
Yellow "	1	
	—	10
Per acre		35 lbs.

Remembering the peculiar season of 1883, it is not so surprising as it would otherwise be, that these as sown without grain, on 17th May of the same year, had to be cut twice in order to save from the risk of smothering and killing out certain of the plants. Our Superintendent made the interesting note that at one time—previous to 12th July—the rate of growth was equal to 117 lbs. per acre per day.

(*h*) Green Fodders.

These as usual, are given a place in view of more information, to form a better base for farmers' use.

Plot.	Kind.
85	Lucerne.
86	Rye.
87-2	Sainfoin.
87-1	Red Clover.
88-1	White Clover.
88-2	Crimson Clover.
89-1	Canadian Blue Grass.
89-2	Alsyke Clover.
83	Prickley Comfrey.
82	Corn.
81	Tares and Oats.

(*i*) Grasses.

We have sown the following as a base for future work: seeding 15th May.

Plot.	Kind.	Condition.
	Grasses:	
91-1	Orchard	Heavy, ground well covered.
91-2	Timothy	Heavy, ground well covered.
92-1	Italian Rye	Very strong, and rapid, eighteen inches long.
92-2	Perennial Rye	Very strong, and rapid, eighteen inches long.
93-2	Fine leaved Fescue	Quicker than the Fescues.
93-1	Large leaved Fescue	Slow, and bunching.
94-1	Tall Fescue	Quick grower, strong, and twenty inches long.
94-2	Hard Fescue	Slow, and in bunches.
95-1	Red Fescue	Slow and bunchy.
95-2	Sheeps' Fescue	Slow and bunchy.
96-1	Meadow Foxtail	Slow, but spreading, broad leaved.
96-2	Various leaved Fescue	Slow, thick bunching, fine leaves.
97-1	Wood Meadow	Slow, thick, seems hardy.
97-2	Rough stalked Meadow	Slow, thick, seems hardy.
98-1	Tall Oat	Quick, tillers well, eighteen inches, hardy.
98-2	Yellow Oat	Very slow, not yet prominent.
99-1	Sweet Vernel	Delicate, short and thick.
99-2	Crested Dog's-tail	Slow, and doubtful.
100-1	Creeping Bent	Ground well covered.
100-2	Red Top	Thick, strong, five inches.

(*j*) Potatoes.

(Plots 102 and 103.)

Planted 5th June, ridged 3rd July, harvested 11th September.

PER ACRE.

Variety.	Good.	Small.	Decayed.	Total Produce.
	Bushels.	Bushels.	Bushels.	Bushels.
Snow Flake	152	35	5	190
Dempsey	121	3	$\frac{1}{3}$	124$\frac{1}{3}$
White Elephant	161	7	..	168
Early Rose	123	9	5	137
St. Patrick	148	7$\frac{1}{3}$	..	155$\frac{1}{3}$
Eureka	164	3$\frac{2}{3}$	4	171$\frac{2}{3}$
Early Ohio	110	3	2	115
Brownell's Ver. Beauty	123	8	2	133

(*k*).—Rotations in Cropping.

One of the most difficult, and yet one of the most important agricultural enquiries is the effect of a certain class of crops in rotation, upon certain soils in particular climates and through a particular line of seasons. We have hitherto done nothing in this, but with the hope that the country will see this station maintained thoroughly in many years to come, we have instituted the following:

A	B	C
Plot 116.	Plot 117.	Plot 118.
1. Roots.	1. Bare Fallow.	1. Clover, with Oats.
2. Grass Seeds, with Spring Grain.	2. Grass Seeds with Winter Wheat.	2. Clover, ploughed under.
3. Hay.	3. Hay.	3. Winter Wheat.
4. Hay.	4. Hay.	4. Peas.
5. Pasture.	5. Pasture.	
6. Peas.	6. Peas.	
7. Oats.	7. Oats.	

Briefly, the experiment will be *Roots* versus *Bare Summer Fallowing*, and *Clover*, the three forms of manuring and cultivation most common anywhere.

(*l*).—Oats.

(plots 61-65 and 155-159).

	Bushels per Acre.
Bullman's Black	29$\frac{1}{4}$
Canadian	20$\frac{1}{2}$
Blue Blade	23
Black Tartarian, destroyed by wet	
Potato	34$\frac{3}{4}$
Egyptian	62
Halifax	22
New Zealand	24
Spanish	43$\frac{1}{2}$
Fort William	49
Swiss	29
White Straw	39$\frac{1}{2}$
Sparable	24
White Blade	37
Norway	36
Surprise	37

V.—THE MECHANICAL DEPARTMENT.

We have no department that does so much that is not seen ; the very nature of the work makes it so. What has been done during the past season is fully given in Mr. McIntosh's report to me herewith. By the plan of re-arrangement of the grounds, the present shop will have to be removed, and when this comes about we should have a larger, a better arranged, and a fuller equipped mechanical department.

Mr. Brown,

Dear Sir,—In submitting the ninth annual report of the Mechanical Department in connection with the Ontario Agricultural College, by examining the records I find that the work has been of a very miscellaneous and mixed character ; while we have not had any formidable piece of work to accomplish, yet when taken in detail, each day has had its own duty and requirements. After opening the session our first attention was partly taken up by completing fences at fields 10 and 16 (reported last year) and at the same time erecting a house for portable engine 12x24 ft., with a number of repairs in and about the stables, such as grain boxes, feed boxes, stalls and bindings ; removing supporting columns and putting up new ones and making a number of boxes for experimenting with soils. The first and second weeks of November we commenced to repair and put the winter windows on the College. I here remark that this work takes up both time and expense in the way of repairing broken glass, which is damaged in some way that I am unable to explain. There were also made for this purpose several long ladders, and this has to be repeated every year, as they are so much used about the farm and buildings and are often broken. For the experimental field there were made 1000 pins 2 in. by 2 in., 24 in. long, painted and numbered for staking out the plots, and also nine range posts and sign-boards in connection with the same. About the first of May there was erected about thirty rods of post and board fence, along the south side of this field, and likewise a new patent gate at north entrance. I am frequently asked by students and others as to the comparative cost of board and wire fence and I herewith submit a statement on an average as I have reckoned. In the field board fence we have not to any extent departed from the generally adopted plan, viz., five boards, one twelve inches wide, two eight inches wide, and two seven inches, making in all with face pieces and caps at joints

60 ft. of lumber per rod @ $12 per m	72	cents.
Posts 7 ft. apart @ 12½ cts., per rod	28	"
Nails, per rod @ 3 cts	3	"
Cost of erecting, per rod	28	"

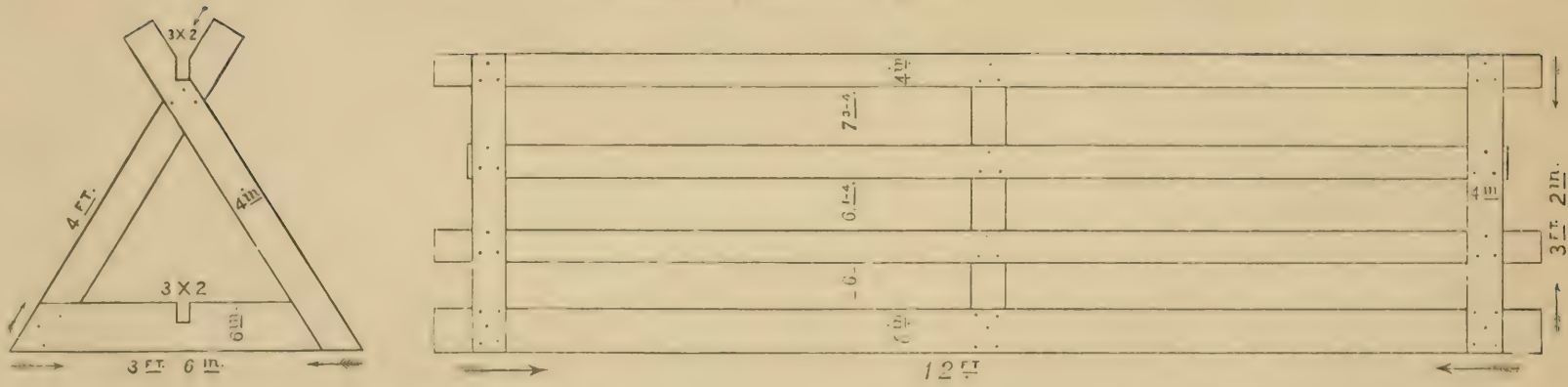
$1.31 cents per rod.

Compare with a seven wire fence :

Seven rods of No. 8 galvanized wire weigh 8½ lbs. @ 6½ cts. per lb. = 8½ × 6½ = 55¼ ; two posts @ 12½ = 25cts ; wire staples 4cts ; cost of erecting 28c per rod, in all $1.02¼, leaving 28cts per rod in favour of seven wire fence.

We are to all appearance far removed from the time when fences can be dispensed with and it is a matter worth some consideration to the general farmer what will be efficient and at the same time inexpensive, and this can be to some extent accomplished by portable or movable fences. There are various kinds in use, of those there are two that we have found very convenient for practical purposes, one of them we have used for a number of years and which you, I think, were the first to introduce into this part of Canada ; for durability and simplicity it supersedes the mortise hurdle (or sheep flake ;) and any farmer with saw and hammer and material can easily construct it. I have on a number of occasions been solicited not only by students but likewise by farmers in the neighbourhood, to give diagrams of it, and it may serve a good purpose to give a representation of it in our annual report for this year. The accompanying cut will give a good idea of the construction ; the pieces are all one inch thick, of common pine or pickings, the lower pieces are six inches wide, all the others four inches, the head being an equilateral triangle of which the base is three feet six inches long, the standing pieces are four

Scale of $\frac{1}{2}$ Inch to the Foot.



PORTABLE FENCE IN USE AT THE ONTARIO EXPERIMENTAL FARM.

feet long with notches cut as shown for receiving the ends of panels, which are twelve feet long, three feet two inches high, and nailed together on three uprights with two and a half inch wrought nails, it will be seen that when in position the fence is three feet five inches high and I have never heard any complaint of cattle or sheep getting over it.

The other fence I have reference to was reported upon a year ago; a model of it was sent to the College by Mr. Greene, of Oakville, Ont.; it is more complicated in its construction, but in some conditions preferable. To any one interested, by communicating with that gentleman no doubt he will give the information respecting it.

For the months of January, February, and part of March the Day Journal records such as the following, viz.: making wheel-barrows, double and whiffle-trees, land-rollers, gravel waggon-boxes, watering-troughs, class room blackboards and in repairing sleighs, waggons and carts, forks and hose, etc.. On an average there is one student from the department each day repairing breakages in College, such as beds, chairs, desks, doors and windows.

After Easter recess the winter windows were taken down and stowed away, all seeding implements were examined and put in trim, field fences overhauled, a few new gates were made and put up, and a quantity of portable fencing; there were also put up around the new cottages a quantity of the Merchants' Union flat steel fencing.

It became a necessity to erect some sort of a shed to stow away buggies and other like vehicles when not in use; this building 24x42 ft. is of a primitive description but serves the purpose so far.

About the first of July you stated to me a want that was often felt, for some kind of a conveyance to transport heavy animals to the railway station or other places. After due deliberation we concluded that a low four-wheeled lorry, rigged with suitable box for loading and unloading, would be the best contrivance. In this we have succeeded, as it gives the utmost satisfaction to all who have occasion to use it, which has been to a considerable extent, especially during the time of the Provincial Exhibition and the fat cattle show.

The next thing I will call your attention to, which of late years has assumed some importance: I refer to the annual sale of farm stock, etc., which brings increased preparation to all departments, and to none more so than the mechanical. After the stock was arranged and the sale bills printed, we found that there were somewhere about one hundred and eighty shipping-boxes required for sheep, pigs, and dogs which were all provided by time of sale.

There were also erected in connection with the sale a large tent or marquee 34x64 ft. the canvas and ropes being purchased from the Dominion Tent Manufacturing Company, Ottawa, the masts, wall poles, stakes, pins and benches manufactured by this department.

In a former report I endeavoured to urge on the attention of the Government the necessity there is for at least one permanent assistant in this department. The reason for this is obvious, if it is to be educational, as it has been from the commencement, and the work so far as it is done should be done properly. I would ask how it is possible for one man to oversee, to instruct, and to plan for from nine to twelve boys at one time, all endeavouring to do something; when, be it remembered, that two-thirds of those students never worked at all till they came here, and the time of the same class under my care is only about four hours per week. Would it not be advisable to have a special instruction division in the department, and time given to instruct more thoroughly in the proper use of the tools and how to work them, at the same time to show and see that they be kept in good working order? Something of this kind would make the Mechanical Department more effective and useful than it has hitherto been. Hoping that this matter will be attended to.

I am,

Sir,

Your obedient servant,

JAMES McINTOSH.

VI.—MISCELLANEOUS.

1.—Mutton and Wool in Nova Scotia and New Brunswick.

The better and more extensive pasturing of live stock is one of the prominent agricultural features of to-day with us by reason of its non-existence, except in the North-West. Under all the irregular and overheated speculation of the pioneers in this trade, our ranches will come out refined and well marked. If winter conditions be to some extent unfavourable to continuous occupation, the summer itself will suffice to make rich, and the coming and going that may be necessary with the herds, from district to district, will add to employment and a stricter system of jurisdiction, in which I am of opinion mutton and wool will take a large place. But it is not necessary to leave our older Provinces to seek for pastures. It is not difficult to see that the growing prominence of general agriculture is making more prominent the unapprehended resources of the country. Not only in arable culture, but certainly in actual letting alone of nature's gifts, in the form of grass, is Eastern Canada losing herself. Are we taking all the care under ordinary easy conditions at our own doors in New Brunwick and Nova Scotia, for example? Allow me to speak very seriously upon this subject.

Great stretches of these eastern Provinces consist of valley, hill side, upland and mountain—part covered with wood or brush and much bare of any timber, where grasses and white clover actually luxuriate. The whole aspect of the country, and the soil particularly, reminds me of much of the highlands of Scotland, which is less sheltered and has less valuable herbage than the other. The Scotch grazings produce the beef and mutton so much liked in England. What are ours doing? Allow a fiercer sun, there is the shelter: admit the greater summer drought, there are numerous rivers, streams and lakes; the soil is equal and the continuous growth is superior here. History, past and present, shows that with such a sunshine as ours some nations would be in posssession of an enormous agricultural wealth by the simple economy of that sunshine in the production of repeated crops of fodder plants in one season—even from a bed of sand. Aside from irrigation in any form, we have at our own doors this moment a wool and mutton field that, properly developed, would astonish the most sanguine. Why is it being let alone? Because of two things—want of knowledge of the subject, and plenty fatness elsewhere. We feel no want, and so are largely dead to what we could do for others. I do not say that we are all dead. I have letters from several, in response to a feeler that I put out last April on this subject in the Ontario press. They are from leading practical men, acknowledging the correctness of my position, describing what they know and asking what should be done. The first thing is to show that it can be done—to do it. We require no Government help, but a Government example; there is both money and enterprise enough with individuals. They simply want the guidance of an "old hand" at the business; he alone knows how to choose variety of subject so essential to sheep life, the caring of them in all their likes and dislikes, as well as to improve the grounds most effectually at the least cost. It is clearly the duty of the Governments of New Brunswick and Nova Scotia to let the world know what field they possess in this particular. If the settlers themselves are so well off, or indifferent, or if local enterprise from St. John and Halifax as centres, is also disinterested, then legislatures must step in. It is not an old story, however, in every progressive country that Government help and example are frail things to lean upon unless thoroughly well handled by able and independent men.

The people of New Brunswick and Nova Scotia, it seems to me, do not know the resources of their own country, and acting, as I do now, quite independently of them or any other person, I charge both provinces with a great amount of shortsightedness and want of push. British Columbia excepted, they hold now the only extensive and naturally suitable lands in the Dominion for the cheap production of wool and mutton. At a rough under estimate, there are in New Brunswick and Nova Scotia some 2,000,000 acres of sheep runs, outside of all arable, bush, rock, water, meadow and the richer cattle grazing of the valleys. These should carry such a number as to produce annually, not

maintain, but to sell off every year, 40,000,000 pounds of mutton and 2,000,000 pounds of wool—an annual gross revenue of, say, $2,800,000. This is no wild speculative calculation, but one based upon my own handling of the same subject in Scotland and Ontario, and upon the experience of other Canadian flock masters. The subject has two aspects—an inside one and an outside one; the system of breeding, rearing and finishing all the flock, or the bringing from a distance and finishing on the runs during October. On the former there may not yet be sufficient arable area to produce fodder and grain for winter maintenance to give encouragement to large enterprise—that is, thousands in place of hundreds of sheep on one range, this would be the independent, and provincially, the most progressive and wealthy, plan.

But it is not the one for immediate speculation and greatest profits. If sufficient blocks of land of the right stamp can be had to rent or purchase, at reasonable figures, I am satisfied the migratory system would be best. From Scotch experience of a similar character, as well as knowledge of what can be done with sheep in Ontario, and making allowance for all possible contingencies, a capital of $12,000, properly handled, would make the following annual history:—

SHEEP GRAZING IN NEW BRUNSWICK AND NOVA SCOTIA.

(Area required, 6,000 acres.)

Cost of 2,000 shearlings in Ontario, averaging 100 lbs., 1st May at $5.50		$11,000
Expense of purchasing and concentrating		500
Freight, 15 cars, Toronto to Moncton		1,200
Food by rail		100
Capital required		$12,800
Two shepherds, six months		400
Assistance shearing		160
Freight to seaboard, 1st Nov.		300
Grazing, 50c. per head		1,000
Interest on capital		500
Incidentals		200
Total debit		$15,350
Clip of 2,000 head, 15th May, medium wool, 7½ lbs. at 17c.	$ 2,850	
Value of 1,940 (60 deaths) at seaboard, averaging 140 lbs. at 5½c.	14,838	
Total credit		17,388
Balance, being clear profit, per annum		$2,038

Double the rent, if you choose, and allow for greater loss than I have done, and there would still remain a large margin of profit—so large as to throw doubts on the whole character of the estimate. Need I say that in this, as in some other things in the physical world, we do not see the wealth at our own feet so clearly, but seek for it away among the clouds.

2. Where to find the Best of Everything Among Sheep.

When men ask us what to recommend as best in wool and mutton, the answer is not a difficult one when taken up in the light of these days.

We are sure first of all that however suitable any particular district or farm may be for a particular breed, there cannot possibly result the success desired unless the party

interested believes in his subject. With all its great value, practical knowledge is second in importance to that thorough confidence which places the object as superior to any thing else in the same line. When a man is thus satisfied in his own mind—right or wrong it may be for others—that nothing can touch his favourites as bread winners, the practical knowledge necessary will follow, though necessarily at greater risk, until practice becomes full.

In the next place we are most clearly of opinion that there is money in the proper assorting of breeds of sheep to the physical conditions known to be best for them, even to a fine point as between the extremes, which of course are not difficult to name. There is a steady unseen deterioration among sheep when long upon a run that is very different from what gave them their characteristics. A few years do not always suffice to show the back-going, and the best management in every respect cannot cope with such an irresistible agency.

Then again we think it is necessary to know only two breeds of sheep well in order to an acquaintance with all other breeds of known prominence. Among the thirty different breeds of the world, there are but *eight* of such a standing as to require a world wide recognition. This latter position must be clearly understood in this sketch, because other breeds are unquestionably the best for particular British localities that, at the same time, so far as present knowledge stands, could not leave their homes with any chance of success.

The eight leading breeds of the world are :—Lincoln, Cotswold, Leicester, Oxford Down, Hampshire Down, Shrops Down, South Down, and Merino. Now, as a matter of fact, the Leicester and South Down represent nearly all, if not all, the good things possessed or desirable in any of the six others, or for that matter of it, in any breed whatsoever. To substantiate this position it is necessary to agree upon what is wanted in an average position to meet the average market of the world.

In our opinion, the mutton and wool field in all its requirements is provided for under the following heads :—

1. Early maturing.
2. Weight of Fleece.
3. Permanency of Character.
4. Quality of Wool.
5. Weight of Flesh.
6. Constitution.
7. Freedom from Disease.
8. Impressive Powers.
9. Reliable Breeding.
10. Hardiness.
11. Uniform Fleece.
12. Quality of Flesh.
13. Prolificness.
14. Foraging.
15. Disposition.
16. Good Mothers.
17. Least Offal.
18. Wool length.
19. Cost of Production.

These are given in the order of their importance as understood by us, and their respective values are elsewhere submitted. That men differ to a considerable extent in valuing the points of any class of live stock is admitted, but we think few will dispute the list of requirements thus given. What we call the characteristic build of the frame of different breeds is a necessary accompaniment of what otherwise characterises them, so that no separate valuation of carcass points is required in this issue. We are not judging individual merit, but the standing of the breed.

In the order of classification by wool the following table will convey the explanations thus far :—

Standing of Leading Breeds of Sheep, as Recognized in 1884.

POINTS.	Maximum Value.	Lincoln.	Cotswold.	Leicester.	Oxford Down.	Hampshire Down.	Shropshire Down.	South Down.	Merino.
1. Early Maturing	200	150	140	200	180	170	170	180	75
2. Fleece Weight	150	150	140	130	135	130	125	80	100
3. Permanency of Character	80	40	50	35	30	60	55	75	80
4. Wool Quality	70	40	37	48	50	60	58	65	70
5. Flesh Weight	50	50	45	40	38	35	33	25	20
6. Constitution	50	25	40	40	45	35	30	30	20
7. Freedom from Disease	50	33	33	20	30	45	40	30	25
8. Impressive Power	40	20	25	35	15	30	27	40	33
9. Reliable Breeding	40	23	25	20	40	35	35	38	15
10. Hardiness	40	20	30	15	30	35	35	40	25
11. Uniform Fleece	40	30	28	20	25	35	33	35	40
12. Flesh Quality	30	15	18	12	22	28	28	30	10
13. Prolificness	30	18	20	15	30	25	25	28	10
14. Foraging	30	15	18	10	20	23	23	30	25
15. Disposition	20	12	10	18	20	15	15	13	7
16. Good Nursing	20	12	12	9	18	15	15	20	7
17. Little Offal	20	7	9	20	12	15	15	10	8
18. Wool, Length	20	7	8	10	12	15	15	18	20
19. Cost of Production	20	7	10	20	18	15	15	15	12
	1000	674	698	717	770	821	792	842	602

We consider therefore that in view of the many requirements demanded by the average sheep runs of the world, from early maturing through to cost of production, the South Down will meet the bill better than any other. In constitution, freedom from diseases, impressive power, hardiness, quality of mutton, and making a good lamb, this breed stands unequalled ; of course, in other things it is not so strong, and particularly is not up in weight of flesh and wool, but we are looking for something of everything, and not a specialty. We hold that the South Down represents most of the good things among sheep and at the same time is the type of all other Downs. On the other hand the long wools are led by the Leicester, which, with its many weaknesses, is so strong in others as to take an unchallenged position in this competitive card. It is also interesting to note that the value, 717, of the Leicester is nearest the mean of all the eight breeds (735), which may indicate the cosmopolitan character claimed by its admirers.

The study of this card is also interesting in other respects. A breed such as the Hampshire Down that takes not one first-class position, is yet the second best in all the contest, and unquestionably it is due much of this to its most recent improver—the South Down. The same remarks apply to the Shrops.

History says that in the modelling of the Oxford Down, man had in view to "obtain the *carcass* of the Leicester, the *constitution* of the South Down, and the *wool* of the Merino." How far these have been realized this Table helps to show ; the failure lies in wool, in other respects the breed stands high.

For the "best of everything among sheep," take a pencil and trace a line from each to each of the highest points, and it results as a matter of fact in experience that we want the early maturing, the large proportion of butchers' meat, and the small cost of production of the Leicester ; the weight of flesh and wool of the Lincoln ; the permanency of character, quality of wool, and uniform fleece of the Merino ; the constitution, freedom from disease, impressive power, hardiness, quality of flesh, foraging and good nursing, of the South Down, with the reliable breeding, prolificness, and disposition of the Oxford Down.

3. Standing of Leading Breeds of Cattle, as Recognized in 1884.

This is certainly no new subject to the average reader and practical cattle-man. Indeed, otherwise, it may be getting threadbare in the view of many, as well as muddled, and at any rate, not one whit more reliable, some may think. The agricultural press of Europe, Australia and America has of late years given a great deal of valuable information on the various breeds of cattle as experienced in particular districts, for special purposes. But men remain unsatisfied. So long as the live stock interest holds the place it now occupies, there will always be some of us who "want to know" what experts at least, if not every advanced farmer, already know, in regard to the conduct of both cattle and sheep.

This form of knowledge has been very prominently brought home to this Experimental Farm during the last two years for several reasons, and particularly in connection with the education of our "Special Live Stock Class." Our acquaintance with breeds is supposed to be of the widest character, and as the class in question, with increasing numbers, is of that intelligent keenness which delights the teacher, no effort is being left to further their study of such an interesting field. In furtherance of these ends we have asked the Government to provide us with those breeds of cattle and sheep generally recognized as the best. We think that at the present time they are limited to *nine* of each. The sheep are discussed in another chapter herewith, and this shall therefore be confined to cattle.

With one exception, it is not necessary to leave the British Isles for what any one wants in any line of cattle life, and curiously enough, the same remark applies to sheep. We have no time at present to show what way the characteristics of breeds have been cultivated and established, nor to what particular purpose each is best adapted in Canada. We shall, for the present, meet a good deal of the demand by giving a list of points embracing all the field, with a valuation according to the best of our knowledge. Of course men differ in opinion as to both the order of merit and the special valuation of

points. The character of the controversy may be imagined, were an admirer of each breed to be appointed to value such a table as we now present to the country. It could not be done by them, and is clearly more safe in the hands of such as ourselves, whose only interest is, in this regard, that of everybody's. We are aware of the danger of such a position, but having had to taste as much vinegar as this during the last nine years it would be weak to withdraw now.

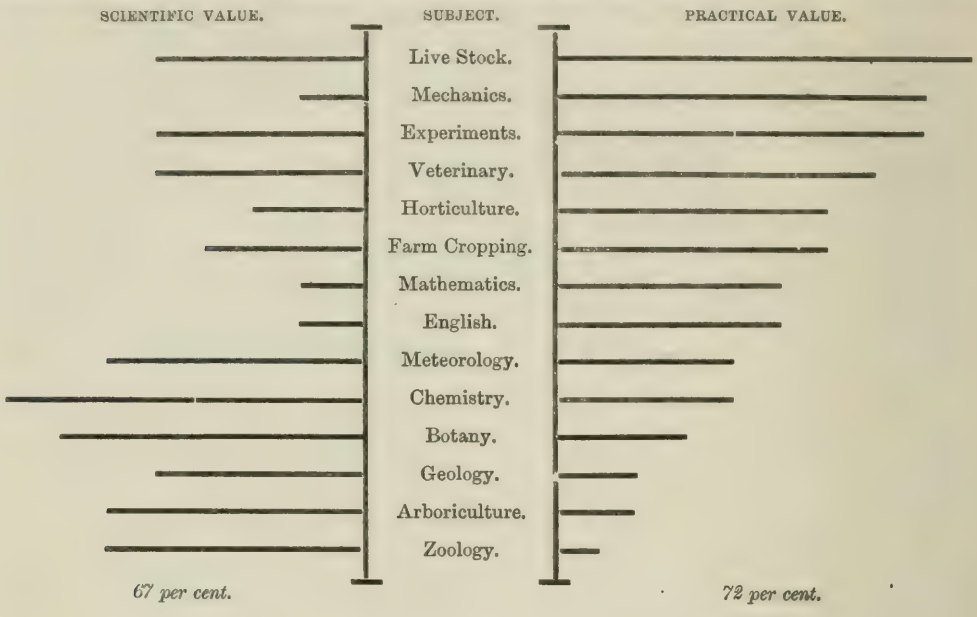
We think there are three distinct types of cattle, practically considered, and as exemplified by special characteristics. These characteristics can only lead to flesh and milk, the working ox being not only a third rate, but also a thing of education to any class. We still hold the position taken a few years ago, that no one breed of cattle or sheep can give the like value of everything that two other breeds can by an equal valuation of points. There appears to be a contradiction to this assertion in the case of this table. For example, the best for beefing *under every possible circumstance* is the Hereford at 916, and the best in milking is the Dutch at 918; the mean of these two is 917, which is not equal to the Devon that takes a valuation of 938 as a breed possessing both beefing and milking properties. But, the Devon with the Norfolk and Suffolk Polls is valued upon a separate basis from the *special* beefer and milk breeds, and therefore cannot properly be compared with either. Were the Devon placed as a beefer only, or as a milker only, it would occupy a comparatively low position, but, taken for what it can do in its own field, it stands high. Or in other words, it may be said that any breed prominent both for beef and milk is not worth a valuation scale of 1000. In other respects the valuation will be easily understood.

Standing of Leading Breeds of Cattle as Recognized in 1884.

Points.	BEEF.					BEEF AND MILK.			MILK.			
	Max. Value.	Short-horn.	Hereford.	A. A. Poll.	Galloway.	Max. Value.	Devon.	N. & S. Polls.	Max. Value.	Dutch.	Ayrshire.	Jersey.
1. Early Maturity	200	200	180	195	125	140	130	140	75	75	60	55
2. Permanence of Character	100	80	90	68	100	85	85	70	70	63	65	70
3. Weight of Flesh	150	150	134	143	110	100	85	100	70	70	50	35
4. Condition	50	40	50	36	46	50	45	50	50	50	43	30
5. Freedom from disease	60	50	60	48	57	60	60	55	60	60	50	57
6. Impressive power	40	40	35	35	33	40	40	25	40	40	33	35
7. Reliable Breeding	60	48	60	50	58	60	60	54	60	60	55	56
8. Hardiness	60	40	55	45	60	55	55	48	50	45	50	30
9. Quality of Flesh	30	18	22	24	30	25	20	25	20	13	20	18
10. Foraging	40	27	37	30	40	40	40	37	40	34	40	27
11. Disposition	35	35	28	33	24	50	50	38	60	55	48	60
12. Good Mothers	25	20	25	21	23	25	25	20	25	23	19	25
13. Least Offal	20	17	20	18	20	15	13	15	10	10	9	8
14. Quantity of Milk	60	60	55	53	50	130	110	130	200	200	185	100
15. Quality of Milk	25	25	20	22	20	65	65	50	100	50	30	100
16. Cost of Production	45	42	45	44	36	40	35	40	40	40	35	28
17. Long use						20	20	17	30	30	25	20
	1000	892	916	865	832	1000	938	914	1000	918	817	754

4. What we are Teaching.

This, as a variety in form of presentation, is easily understood by a simple diagram—and while, of course, the relative value and importance of each subject may be disputed, it must be remembered that the lines of value, as follows, are affected by the appliances and opportunities on hand, as well as what is considered to be their relative importance :—



Scientifically and practically combined, therefore, we have a good idea of the work of the College and Farm as at present conducted.

I have the honour to be,

Sir,

Your obedient servant,

W. BROWN.

APPENDIX.

INVENTORY AND VALUATION OF LIVE STOCK AND IMPLEMENTS ON HAND DECEMBER 31st, 1883.

Horses.

13 working horses	$2,350 00

Cattle.

1 Shorthorn bull	400 00
1 Shorthorn bull calf	200 00
1 Shorthorn cow	400 00
1 West Highland bull	100 00
1 Polled Angus cow	1,000 00
1 grade heifer	75 00
8 milch cows	320 00
9 steers (not on experimental feeding)	648 00

Experimental Cattle.

35 steers	1,732 50
5 heifers	227 70

Sheep.

2 Merino shearling ewes	40 00
22 experimental wethers	110 00
5 wether lambs	25 00

Pigs.

2 boars, Berkshire and Essex	150 00
4 sows for breeding	200 00
15 young pigs, various ages	150 00
Scotch collie dogs	50 00
	$8,178 20

Value of farm implements per inventory	$5,000 00
Value of garden stock and implements	1,380 00
Value of experimental stock and implements	1,026 00
Value of carpenter shop, tools, etc	310 00
	$15,894 20

PART VII.

REPORT

ON

HORTICULTURE AND ARBORICULTURE.

To the Honourable, the Commissioner of Agriculture :

Sir,—In briefly reporting on the practical Horticultural work of this Institution for the year about to close, I beg to say that, notwithstanding a peculiar and somewhat precarious season for crops, in other respects it has been specially favourable for many of our operations on hand, particularly for spring work, transplanting, sodding, etc., and on the whole, average crops have been secured, and considerable progress has been made in the direction of the object sought to be attained.

Our principal work during the summer months has been the improvement of the grounds, in accordance with a plan adopted by the Government in 1882, and the work commenced in the latter months of that year ; but comparatively little was accomplished until this season, when operations commenced about the first of April, or as early as practicable from the depth of snow, by transplanting a number of evergreens, consisting of Norway spruce and Austrian pine, the largest of which were prepared in the fall by digging a trench about eighteen inches wide around and partially underneath the tree, severing all the large roots and leaving a ball from one to two tons in weight, according to size of trees, filling the trench with straw, or stable manure, to prevent the frost getting underneath, but allowing the ball to get frozen solid. In this state they were moved in a stone-boat drawn by a span of horses, into holes previously prepared for them. These trees, over one hundred in number, which had been growing on the grounds from eight to ten years, being planted at or soon after the origin of the Institution, and now varying from six to sixteen feet in height, were thus successfully moved into desirable positions without a solitary failure. This may readily be attributed to the unusually favourable season for such operations, and we willingly admit that the cool season and extra amount of moisture throughout the early summer months had much to do with the success, but the experiment clearly proves that our Canadian climate affords an opportunity of thus moving large and valuable ornamental trees that cannot so readily be done by any other modes. In the further prosecution of the work, the principal drive leading to the College was completed, also the drives and walks connected with the new buildings erected the previous year, the design for flower garden laid out, involving an amount of sodding, bounding the walks and beds to the extent of many hundred square yards, and I may here say that the flower beds when furnished with plants, looked exceedingly well, and were admired by all throughout the season.

With the exception of about three acres around the new building, which were seeded down in the spring (and have done well), the whole ground has been kept in a cultivated state during the summer, all necessary grading and levelling being carried on at the same time, to the full extent of the means appropriated for that purpose, leaving the land, as it now is, in good condition for seeding down in the spring, and planting, as intended and

as provided for in the plan, an arboretum, consisting of all the trees and shrubs (native or exotic), deemed sufficiently hardy to stand this climate, arranged in groups according to their respective families or natural orders. This idea was conceived and a selection made by a committee of the Fruit Growers' Society, sanctioned by the Government, and commenced in 1880, and considerably increased the following year, but to admit of the grading and leveling required in the improvement of the grounds, it was found necessary to lift the whole of the plants, which was done with all possible care in the fall of 1882, and last spring, with a good many additions, they were planted in rows in a small nursery half an acre in extent, established in the experimental ground, partially arranged according to their respective families. The collection now amounts to over four hundred distinct varieties of deciduous and evergreen trees and shrubs, representing over fifty natural orders, to be planted in the spring, as above stated.

There is also much to be done in the way of heavy transplanting from the overcrowded borders, in many instances three or four trees occupying the space required by one, and, unless speedily relieved, the whole will be injured. At this work we were engaged until the winter set in.

Kitchen Garden.

In this department we have had both success and failure. Many of the culinary vegetables were plenty in quantity and excellent in quality. The crops of asparagus, beans, peas, spinach, beets, carrots, onions and celery were above the average, and all that could reasonably be desired. Early potatoes, although a heavy crop, and proving good throughout the months of July and August, about the end of the latter month, disease made its appearance and spread steadily and so rapidly, that by the end of September, the crop was comparatively worthless. Of twelve or fifteen varieties, all seemed to suffer alike. Corn, cauliflower and winter cabbage, were somewhat late, and only about two-thirds matured sufficiently for use. Cucumbers, melons, citrons, squash and tomatoes although very promising throughout the summer months, proved all but a failure. The almost unprecedented severity of the frost, coming so early as the first week in September, cut them completely down, so that they were serviceable only as an addition to the compost pile.

The fruit trees in the kitchen garden are just coming into bearing, and a few good samples of apples were produced this year; also a few cherries and plums, but I regret to say that "black knot" has made its appearance in the latter to such an extent, that in using the only known remedy, viz., the knife, we have already mutilated some of the best trees.

Orchards.

Of the fruit department generally, I need say but little, it being under the supervision of the Fruit Growers' Association, whose committee will report, and I have no doubt will give all due prominence to this branch, which they have done so much to foster and forward, and whose object and wishes, it need hardly be said, I have endeavoured, to the best of my ability, to carry out.

It may be permissible, however, to say that all fruit trees and shrubs stood the past winter remarkably well, being mostly protected by a deep covering of snow from the latter part of November to the first of April.

Small fruits—gooseberries, currants and raspberries—were fairly productive, and the plants made a good average growth.

Strawberries, although promising well in the early spring, were attacked by a blight during the flowering season, and, consequently, but a poor crop of very indifferent fruits was secured.

Grape vines, on account of the cool and rather wet season, were somewhat backward, especially the young vines planted last spring, which made but a small and delicate growth. Yet they are nearly all alive, and, we expect, have made considerable root growth. The older vines, however, now planted three years, made a more vigorous growth of wood, and showed quite a few bunches of fruits, but, from the lateness of the

season, were unlikely to ripen. The severe frosts, however, referred to as coming so early, put an end to all doubts, by completely destroying both the fruit and the foliage and killing back the unmatured wood, in some cases to near the ground, but still sufficient wood remains to shew, with a favourable season for fruit next year, a variety of sorts seldom met with on an equal space, which will be understood when I say that the ground under three acres in extent, with about five hundred vines in all, contains a variety of over eighty different sorts (a list of which was given in last year's report), each having claim to some distinctive property or merit, according to the tastes or prejudices of those who have introduced them, and, growing side by side under equal conditions they cannot fail to prove instructive to students as well as to visitors who are interested in grape culture.

Apple Orchard.—Of the old apple orchard adjoining the College Buildings, which has done good service in past years, little can now be said. During the last two years it has been so reduced by the changes taking place on the grounds that only a few trees on the south side now remain, which have given a few apples this season, and they in their turn will also soon have to give way for required alterations.

But I am glad to say that the young orchard continues in a thriving condition, and promises in the course of a few years to make up for all deficiencies. It is now about eighteen acres in extent, and contains over twelve hundred fruit trees, including one hundred and thirty varieties of apples, fifty-five of pears, thirty of plums and eighteen varieties of cherries.

About two acres of ground yet remain to be planted, intended principally for new varieties from time to time as presented, a committee of the Fruit Growers' Society making the selection, a few vacancies have occurred during the year, some of them incidental to cultivation, which it is intended to fill up in the coming spring. A shelter belt or wind break was completed last spring, along the north side of the orchard, by planting over two hundred Norway spruce from four to six feet in height, all of which are growing without a single failure. Indeed, all planting and transplanting operations, on account of copious and timely showers throughout the growing months, has this season been specially successful.

Nursery.—The nursery ground already referred to, is divided into five plots, each to be bounded on the north and south sides by hedges composed of different shrubs. When completed they will be ten in number, intended as permanent specimen hedges. Four of these only are planted, viz., white cedar, Norway spruce, barberry and buckthorn. The various plots now contain, besides the material intended for arboretum, from two to three thousand seedling forest trees, consisting of black walnut, butternut, hickory, white oak, birch, ash, elm, several varieties of maple, Norway and native spruce, etc., some of which have been raised from seed in the garden or experimental ground, and intended for the farther extension of forest tree clumps on various parts of the farm, as from year to year may be decided on, for the double purpose of effect in breaking views and showing the growth and progress of the trees under cultivation.

A clump of each of the following trees is already planted: black walnut, butternut, sugar maple and larch, native and European; also a mixed clump, containing ash, elm, birch, linden, larch, walnut and butternut, etc.

The first of these were planted three years ago, under the superintendance of Professor Brown. They are now well established, and last year have made a large and healthy growth.

Greenhouses.

I regret to say that in this department but little progress has been made during the year, although a few new plants have been added to our collection, and sufficient material secured to keep up the stock of bedding plants, etc. The buildings still remain in the unsatisfactory and unsafe state as reported for the last three years, and, although we have no desire to grumble, this remains our principal grievance. The many and pressing demands for alterations and repairs are postponed from time to time, fully expecting each year that the present structure will no longer be necessary, from the decayed and shaky condition of the whole fabric, externally and internally; with its defective heating flues,

it is only with the greatest care and attention that plants can be kept in anything like a healthy state through the winter, and if we are to keep pace with the requirements, I cannot urge too strongly the necessity for having the proposed new buildings erected the coming season.

The present potting shed and workshop is also very unsightly in the position it occupies, as well as unsuitable for the purpose required, it being little better than an open shed which cannot be heated, is very incommodious and uncomfortable for the students at times when inside labour only is practicable.

In the winter months, as heretofore, a course of practical instruction, consisting of root and top grafting, budding, layering and the various modes of propagating plants, was given, and practised by all the students taking their routine in this department.

For the senior or second year students a further course was pursued, including the general care and management of greenhouse and half-hardy plants, the various systems of heating, the ventilation, temperature and moisture required, the composition of desirable soils, the potting, growing hybridising and selection of plants generally.

The construction of hotbeds, their utility and necessary care, with the usual means of success and the common causes of failure, some of the insect pests and diseases, with their cause and cure. Also the common and technical names of the plants we have, with the natural orders to which they belong.

And I have pleasure in saying that the majority of the students taking this course passed a very creditable examination at the close of the session.

The following is a list of the greenhouse and bedding plants that we have in stock.

JAS. FORSYTH,

Superintendent

LIST OF GREENHOUSE PLANTS.

ACANTHACEÆ.

Justicia carnea	flesh-colored Acanthad.
" magnifica	large-flowered "
" pumila	dwarf "
Labonia floribunda	free-flowering Labonia.
Sanchezia nobilis	noble Sanchezia.

AMARANTACEÆ.

Alternanthera achyrantha	chaff-flowered Alternanthera
" procumbens	trailing "
Achyranthus tricolor	three-colored Achyranthus
Iresine accuminata	acute-leaved Amaranth.
" Lindenii	Lindens "
Amaranthus tricolor	three-colored "
" Caudatus	love lies bleeding "
Celosia cristata	crested Cockscomb.
" compacta	compact "
" pyramidalis	tall-feathery "

AMARYLLIDACEÆ.

Amaryllis Belladonna	Belladonna Lily.
" Blanda	Charming "
Agave Americana	Am. Aloe or Century Plant.
" Yuccæfolia	Yucca-leaved.

APOCYNACEÆ.

Allamanda Cathartica	cathartic Allamanda.
" Schotti	Schott's "
Dipladenia accuminata	pointed Dogbane.
" Splendens	shining "
Nerium carneum	flesh-colored Oleander.
" alba flore pleno	white double-flowered Oleander.
Vinca major variegata	large variegated Periwinkle.
" minor	smaller "
Rhyncospermum jasminoides	Jasmine-like Dogbane.

ARACEÆ.

Collocasia metallica	metal-like Collocasia.
" gigantea	large "
Caladium esculentum	esculent caladium.
" bicolor	two-colored "
" tricolor	three " "
Philodendron magnificum	large Philodendron.

ARALIACEÆ.

Hedera helix	common English ivy.
" canariensis	Irish "
" folis aurea	golden-leaved "

ASCLEPIADACEÆ.

Hoya carnosa	flesh-leaved wax plant.
" bella	beautiful "
" fruticosa	shrubby "
Stephanotis florabunda	free-flowering Stephanotis.

ASTERACEÆ.

Artemisia argentea	silvery wormwood.
" abrotanum	Southernwood.
Centaurea candidissima	very compact centaurea.
" argentea	silvery "
" gymnocerpa	cut-leaved "
Cineraria multiflora	many-flowered Cineraria.
" maritima	sea-side "
" admiration	hybrid "
Chrysanthemum aureum	golden chrysanthemum.
" hybrida	hybrid "
Gazenia splendens	showy gazenia.
" subulata	awl-leaved "
Gnaphalium albescens	white cudwort.
" obtusifolio	blunt-leaved cudwort.
Pyrethrum flore-pleno	double white feverfew.
" aureum	golden "
Stevia serrata	saw-leaved stevia.
" incanescens	hoary "
" variegata	variegated "
Tussilago discolor	two-colored coltsfoot.
" farfarafolis	variegated "
Eupatorium pubescens	downy eupatorium.
" chamdærifolia	germander-leaved "
" odoratum	scented "

Ageratum Mexicana	Mexican ageratum.
" angustifolia	narrow-leaved "
" Nana	dwarf "
Othonna linifolia	flax-leaved ragwork.

BEGONIACEÆ.

Begonia fuchsoides	fuchsia-like Begonia.
" Rex	foliage "
" bulbilifera	bulb-bearing "

BRASSICACEÆ.

Alyssum maritima	sea-side alyssum.
" flore pleno	double-flowering alyssum.
" variegata	variegated "
Mathiola purpurea	purple stock.
" alba flore-pleno	double white stock.

CARYOPHLACEÆ.

Cerastium tomentosus	downy mouse-ear.
Dianthus caryophloides	carnation pink.
" Japonicus	Japan "
" Chinensis	China or Indian pink.
" " flore-pleno	double "

CACTACEÆ.

Cereus grandiflora	night-blooming Cereus.
" nigra	black "
" polygonus	many-angled "
Epiphyllum truncatum	Indian-fig cactus.
" fragrans	fragrant "

CELASTRACEÆ.

Euonymus Japonica	Japan Spindle Tree.
" aurea variegata	golden variegated.

CINCHONACEÆ.

Bouvardia splendens	shining Bouvardia.
" pubescus	downy "
Gardenia flore-pleno	double-flowered Cape Jasmine.
" Florida	flowery "
Ixora arborea	tree-like Ixora "
" coccinea	scarlet " "

COMMELINACEÆ.

Tradescantia divaricata	straggling spiderwort.
" zebrina	striped "

CORNACEÆ.

Aucuba Japanica	blotch-leaved Japan Aucuba.

CRASSULACEÆ.

Crassula ericoides	heath-like house leek.
" ramosa	branchy "
Echeveria grandiflora	large-flowering "
" retusa	blunt-leaved "
" metallica	metal-like "
Sedum glacum	milky stonecrop.
" variegata	variegated stonecrop.
Sempervivium stellata	starred house leek.
" tectorum	roof "

CYCADACÆ.

Cycas angulata	sharp-cornered sago tree.
" revoluta	rolled-backed-leaved.

EHRETIACEÆ.

Heliotropium corymbosum	corymbed Turnsole.
" incarnum	hoary "
" linifolium	flax-leaved "

ERACACEÆ.

Erica formosa	handsome heath.
" fragrans	fragrant "
" globosa	globe-flowered heath.
Azalea arborescens	tree-like azalea.
" florida	flowery "
" alba flore pleno	double-white azalea.
Rhododendron ponticum	rose bay rhododendron.
" hybrida	hybrid var. "

EUPHORBIACEÆ.

Euphorbia jacquinifolia	milkweed or spurgewort.
" splendens	shining "
Croton rosmarinifolia	rosemary-leaved croton.
" angustifolia	narrow-leaved "
" discolor	two-leaved "
Poinsittia pulcherrima	very pretty poinsittia.
" plenissima	very double "

FABACEÆ.

Chorozema angustifolia	narrow-leaved chorozema.
" ilicifolia	holly-leaved "
" cordata	heart-shaped "
Coronilla glauca	milky-green coronilla.
" variegata	variegated "
Genista umbellata	" broom.
" Scoparius	Scotch "
Mimosa pudica	sensitive plant.

GERANIACEÆ.

Geranium canescens	hoary-leaved crane's bill.
" argentium	silvery "
" incanescens	many-cleft "

Geranium flora pleno ..... double-flowering crane's bill.
Pelargonium speciosum ..... showy stork's bill.
" Andrewsii ..... Andrew's var. Stork's bill.

GESNERACEÆ.

Achimenes formosa ..... handsome achimenes.
" grandiflora ..... large-flowering "

GRAMINACEÆ.

Eulalia Japonica variegata ..... variegated eulalia.
" " zebrina ..... striped "
Panicum variegatum ..... variegated panic-grass.
" tricolor ..... three-colored anic-grass.

HYDRANGEACEÆ.

Hydrangea Japonica ..... Japan Hydrangea.
" speciosa ..... showy "

JASMINACEÆ.

Jasminum odoratissima ..... sweet-scented Jasmine.
" grandiflora ..... large-flowered "

LAMIACEÆ.

Coleus barbatus ..... bearded Foliage Plant.
" Blumi ..... Blume's "
" hybrida ..... hybrid var. "
Salvia splendens ..... showy Sage.
" patens ..... spreading Sage.
" coccinea ..... scarlet "
Thymus aurea variegata ..... golden variegated Thyme.
" argentea " ..... silver " "
Lavandula pubescens ..... downy Lavander.
" spica ..... common Lavander.

LILIACEÆ.

Lilium auratum ..... gold-tipped Lily.
" Japonicum ..... Japan "
" Lancifolium ..... lance-leaved "
" " rubrum ..... white and red "
Aspidistra lurida ..... lurid Aspidistra.
" variegata ..... variegated "
Cordyline Australis ..... Australian Club-Palm.
Dracæna Australis ..... Australian Dragon-Tree.
" purpurea ..... purple "
" gracilis ..... slender "
" Cooperii ..... hybrid var. "
Hemerocallis flava ..... yellow Day-lily.
" speciosa ..... showy "
" variegata ..... variegated "
Scilla villosa ..... Sea-leek or Squill.
" hyacinth ..... hyacinth-leaved "
Yucca filamentosa ..... thready Adam's needle.
" aloifolio ..... aloe-like "
" gloriosa ..... glorious "

LOBELIACEÆ.

Lobelia gracilis	slender Lobelia.
" erinus	blue "
" speciosa	showy "

LYCOPODACEÆ.

Lycopodium denticulatum	toothed club-moss.
" stoloniferum	runner-bearing club-moss.
" densum	dense "

MALVACEÆ.

Abutilon striatum	striped flowering Maple.
" Thomsoni	Thomson's "
" Boule de Neige	large white "
Hibiscus coccinea	scarlet Mallow.
" heterophyllus	various-leaved Mallow.

MARANTACEÆ.

Maranta bicolor	two-colored Arrowroot.
" zebrina	striped-leaved "
Canna gigantea	largest Indian shot.
" Indica	Indian "
" atropurpurea	dark purple "

MORACEÆ.

Ficus elastica	elastic-gum India-rubber tree.
" macroylla	large-leaved Fig tree.

MYRTACEÆ.

Eucalyptus globulus	Australian blue Gum tree.
" myrtifolio	myrtle-leaved "
Punica Albescens flore-pleno	double-white Pomegranate.
" rubrum	red "

MUSACEÆ.

Musa cavendishii	Cavendish's Banana.

OLEACEÆ.

Olea fragrans	fragrant Olivewort.
Forsythia viridissina	very green "
" suspensa	hanging "

ONAGRACEÆ.

Fuchsia fulgens	glowing Fuchsia.
" splendens	showy "
" avalanch	hybrid var. "

ORONTIACEÆ.

Calla Ethiopica	Egyptian or Calla Lily.

OXALIDACEÆ.

Oxalis Brasiliensis ..... Brazilian wood-sorrel.
" multiflora ..... many-flowered "

PALMACEÆ.

Borassus flabelliformis ..... fan-leaved Palm.

PHILESIACEÆ.

Lapageria rosea ..... rose-flowered Lapageria.

PASSIFLORACEÆ.

Passiflora alata ..... winged-stalked Passion flower.
" quadrangulata ..... square-stemmed "

PIPERACEÆ.

Peperomia ..... stained Peperomia.

PINACEÆ.

Cupressus Australis ..... slender-branched Cypress.
" pendula ..... drooping " "
Sequoia gigantea ..... gigantic pine of California.

PLUMBAGINACEÆ.

Plumbago capensis ..... Cape Leadwort.
" Mexicana ..... Mexican "

POLYGALACEÆ.

Polygala gracilis ..... slender Milkwort.
" purpurea ..... purple "

POLYMONIACEÆ.

Cobœa scandens ..... climbing Cobœa.
" variegata ..... variegated "
Coccoloba uvifera ..... grape-bearing Coccoloba.

POLYPODIACEÆ.

Dicksonia scandens ..... climbing Fern.
" arborescens ..... tree-like "
Adiantum pedatum ..... Am. maiden hair Fern.
" capillus veneris ..... British " "
Pteris tremula ..... trembling "
" cretica ..... creton "
Struthiopteris Germanica ..... German Ostrich Fern.
" Pennsylvanica ..... Pen. " "
Cystopteris bulbiferum ..... bulb-bearing "
" fragilis ..... fragile "

PRIMULACEÆ.

Primula Japonica ..... Japan Primrose.
" sinensis ..... Chinese "

Cyclamen Persicum	Persian Sow-bread.
" Odoratum	scented "
" hederifolia	Ivy-leaved.

RANUNCULACEÆ.

Clematis Americana	American Virgin's-bower.
" flamula	sweet-scented "
" Jackmanii	hybrid var. "

ROSACEÆ.

Rosa damascena	damask Rose.
" muscosa	moss "
" Borboniana	Bourbon "
" Indica	China "
Rubus Japonicus	Japan Bramble.
" " flore-pleno	double-flowering Bramble.

SAXIFRAGACEÆ.

Saxifraga tomentosa	woolly London pride.

SCROPHULARACEÆ.

Alonsoa acutifolia	acute-leaved Alonsoa.
" grandiflora	large-flowered "
Browallia elata	tall Browallia.
" speciosa	showy "
Linaria cymbalaria	Toad's flax.
" reticulata	net-leaved Toad's flax.
Maurandya Barclayana	Barclay's Maurandya.
" semperflorens	ever-flowering "
Mimulus tricolor	three-colored Monkey-flower.
" lutens	yellow "
" moschatus	musk plant.
Pentstemon pulchellum	pretty Pentstemon.
" campanulatum	bell-flower "
Veronica dianthifolia	pink-like Speedwell.
" gracilis	slender "

SMILACEÆ.

Smilax sagittæfolia	arrow-leaved Smilax.
" sarsaparilla	sarsaparilla "

SOLONACEÆ.

Datura arborea	tree-like Thorn Apple.
" fatuosa	proud "
Cestrum auranticum	orange-colored Nightshade.
" latifolium	broad-leaved "
Fabiana imbricata	imbricated Nightshade.
" stricta	erect "
Habrothamnus elegans	" "
" tomentosus	downy "
Nierembergia gracilis	slender "
" aristata	awned-leaved "
Petunia maxima	large-flowering Petunia.

Petunia fimbricata	fringed-flowering Petunio.
Solanum macrocarpum	large-fruited Jerusalem Cherry.
" pseudo-capsicum	bastard Capsicum.

TERNSTROMIACEÆ.

Camellia Japonica	Japan Rose.
" alba flore-pleno	double white Camellia.

VERBENACEÆ.

Verbena diffusa	spreading Vervian.
" hybrida	hybrid var. "
Aloysia citriodora	sweet-scented Verbena.
Lantana salviæfolia	sage-leaved Lantana.
" multiflora	many-flowered "
" coccinea	scarlet "
Clerodendrum Balfordii	Balford's Clerodendrum.
" fragrans	fragrant "
" flore-pleno	double-flowering "

URTIACEÆ.

Pilea muscosa	mossy pistol plant.

VITACEÆ.

Cissus discolor	two-colored vinewort.

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